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The AUTOMOBILE

A Transcontinental Hodge-Podge

Part I

A Photographic Story of Road Conditions from Chicago to California.

By Ernest L. Ferguson

Between Windy City and Omaha Are Many Road Activities That Work for Good.

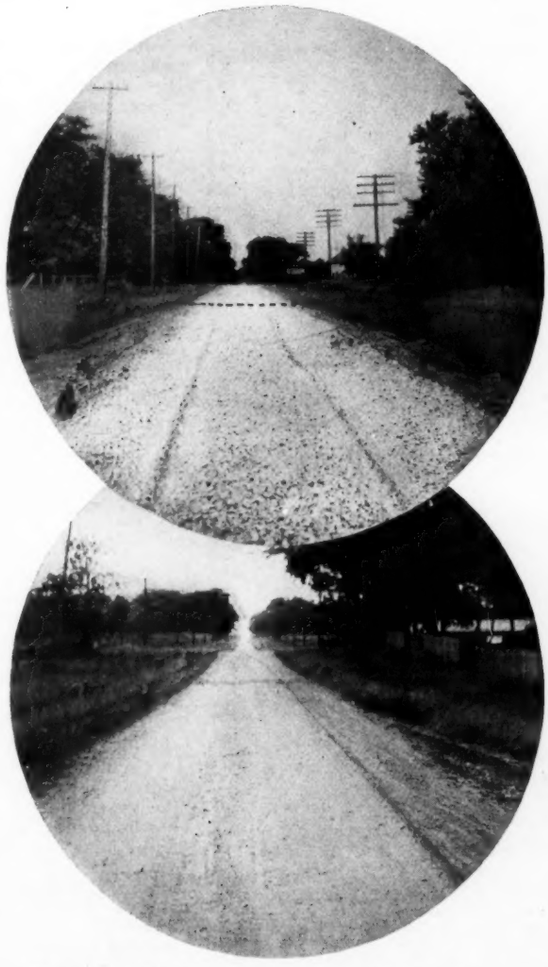
IT is 4,000 miles from New York to 'Frisco. Making this trip by automobile over the transcontinental highway you have six stages of travel. The first is New York to Chicago, 1,100 miles. This is so well known that it may best be described as a tale that is told.

From Chicago to the California line is the section of the transcontinental highway that everyone has more or less concern about. The California line is 300 miles from the Pacific Ocean, and when you once cross it the remaining run to the Pacific is a boulevard.

It is the 2,600 miles between Chicago and the California line that I want to describe with reference to road conditions.

For convenience it logically divides itself into four divisions: One, Chicago to Omaha, 550 miles; two, Omaha to Denver, 650 miles; three, Denver to Salt Lake City, 600 miles; four, Salt Lake City to the California line, 800 miles.

I purpose in this and three succeeding articles giving a close analysis of the various kinds of road building used over this 2,600 miles. This information was obtained during my transcontinental experiences last year on a truck which covered the route familiarly known as the transcontinental one. To be certain to understand this the following is the general itinerary: New York, Albany, Buffalo, Cleveland, Toledo, Chicago, Clinton, Cedar Rapids, Omaha, Kearney, North Platte, Sterling, Ft. Morgan, Denver, Cheyenne, Rawlins, Salt Lake City, Ogden, Wells, Eureka, Austin, Reno, Carson City, Sacramento, Stockton, Oakland and San Francisco.

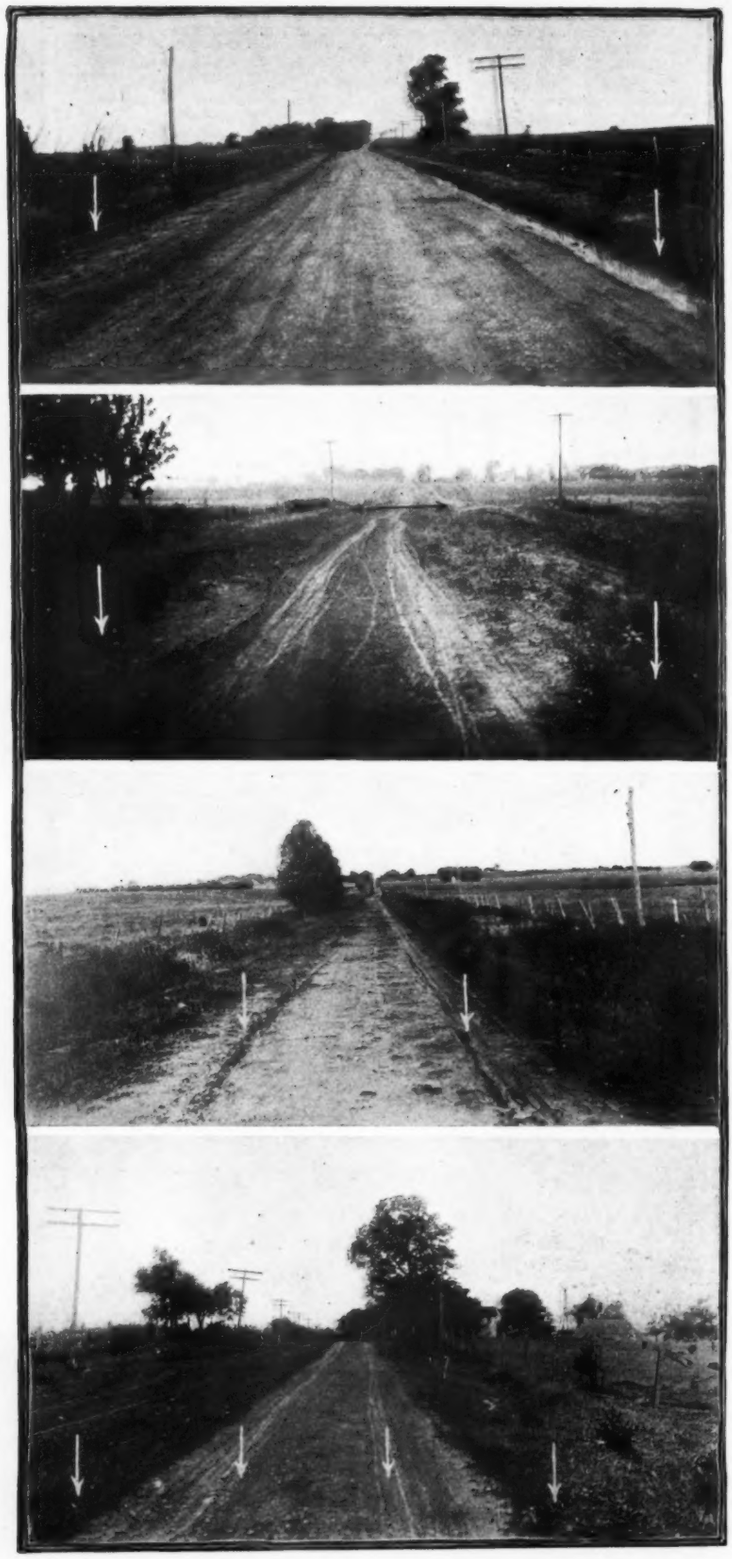


Upper—A finished macadam highway adjoining a loose stone roadway that has the material merely thrown on with a shovel. The soil underneath has been well crowned and side ditched, but no side retaining earth curb has been cut to hold the stone. Lower—A stone road recently resurfaced. Traffic has done most of the rolling to bind the stone. One rut starting to develop on right side

The photographic reproductions herewith are from photographs taken during the route, and which are especially intended to show the variety of roads met with. Those this week are of the roads from Chicago to Omaha, and the captions underneath them tell the variety of roadbuilding carried on in this 550 miles.

That there is necessity for increased transcontinental highway roadbuilding is more apparent to the Westerner than to the Easterner. From direct knowledge more than 300 touring cars made the trip last year over the route outlined. Twenty-five per cent. of this number I met between the Mississippi River and the Sierra Nevada Mountains.

All transcontinentalists do not follow this particular highway. Some prefer the Old Trails highway, some the Southern route, a few the Midland and some the Northern routes. All told, it is conservative to esti-



Top—Stone carelessly placed on top of a soil base. The only ditch is a narrow one on extreme left. All water drainage from the high field and bank on the right has to cross the road to get to ditch, wearing away the road surface.

Upper Middle—Sometime in the past the side banks of this dirt road were cut to fill in a hollow place (middle foreground), but the work was done in an aimless manner. The same effort and time would have given a graded roadway needing only occasional dragging. The general carelessness has forced travel into one line of meandering travel.

Lower Middle—Some years ago this roadbed was raised above the side levels by throwing the ditch excavations into the center. Later crushed stone was put on with a shovel. Traffic eventually depressed the stone, thus forming a ridge at each side of the one line of travel. The result is a trough that holds rain and melting snows.

Bottom—No side drainage. The stone roadway is of the usual spread-with-a-shovel type. Vegetation on each side prevents water from rapidly flowing away from surface.

mate that 500 motorists made the cross-country trip last year. This year the number will nearly double, and next year, with the exhibition at San Francisco, the number will undoubtedly reach well into the thousands.

Crossing the continent in an automobile always brings up two problems in the minds of the novice—one is the hotel facilities en route, and the other is the paraphernalia needed to extricate the car from bad places on the road. After making the trip you invariably find that you overestimated the bad road sections and underestimated the frequency and facilities of the hotels. Such paraphernalia as transcontinentalists have used they have found is sometimes needed in their home sections. The hotel situation en route is illustrated by the experience of a group of tourists which recently started out on the trip with an elaborate camping outfit and high priced chef. In desperation the party finally stopped outside of a town near California and used the combination in order that some returns could be had on the investment.

With malice toward none the criticisms made in this series so far as road and other conditions are from a mileage experience now nearing the 90,000 mark, over an itinerary embracing forty-five states of the Union, together with a considerable section of Canada and a dip into Mexico.

Now comes the Chicago-Omaha section, 550 miles. This is through two states—Illinois and Iowa—with the Mississippi the boundary line between them. The roads in these states make traveling hard.

Bad Roads in Illinois and Iowa

From Chicago to Omaha the route does not present the high quality of roadway conditions that is warranted in the states of Illinois and Iowa when we consider their wealth and their important manufacturing and agricultural communities.

The lack of suitable roadbuilding material is not a claim to be made for Illinois in excuse for its poor roads. In fact the rock removed in constructing the Chicago drainage canal, thousands of cords of which remain as placed at the time of construction, would serve as the foundation of a system of state highways for all northern Illinois.

In crossing the two states every quality of roadway is to be found. Starting at Chicago and its western suburbs, modern construction and upkeep of roads prevail for many miles. Later there are encountered stone roads of more or less quality, but varying in the method of using the crushed stone—lack of method would often be better terminology. The method has a characteristic seemingly peculiar to northern Illinois. This is to haul perfectly good road material onto the prairie roadway and there spread it, a shovel being the only tool used, and then let traffic do the rest.

Effect of Traffic on the Road

Traffic, however, does not let it rest; instead, it is constantly moving the material outwardly at the sides. Where there is side ditching or the stone has been piled as a blanket on the old roadway, or the roadway is higher than the grass sides—such as at fills if an attempt at grading has been made—two deep ruts are soon formed. These become water troughs with every rain and disintegration rapidly takes place.

Then there are long expanses where there is no side ditching, or where the stoneway is level with the grass sides. This latter sometimes comes from previous subgrading and sometimes from the heavier stone blanket, under the weight of traffic, sinking into softer soil. Also there will be found stretches where the stoneway has sunken below the grass sides. Under these circumstances the sides keep the entire surface flooded in rain periods and chuck holes rapidly develop.

Repairing methods, of any of these, generally consist of merely hauling on more crushed stone and usually of the finer sizes. As in the first making the only tool used is a hand shovel. The fresh supply is not only used to fill in the ruts of the first mentioned and the chuck holes of the second, but fre-

quently enough more is added to resurface the entire width.

No attempt is made at binding, under any method, or are there any retaining edge-walls. Neither is there a determined contour, grading or packing, traffic alone being the only rolling-out that the stone receives. These conditions continue as an endless chain, but always with that same weak link and the consequent rapid breaking down of the so-called construction.

During the process of filling and resurfacing traffic is permitted. This at once crowds the new material away at the wheels and ruts are reformed in a few hours. Plus this the stoneway is generally so narrow that only one trackway is possible, thus augmenting the conditions of rut and other destructive penalties. This method, where it is used, is continued year after year and to the writer's knowledge, from direct experiences, has been going on for the past 20 years in some sections of northern Illinois. It can be safely asserted that enough money and crushed stone are and have been used, in the sections where this method prevails, to build a permanent and substantial highway from the lake to the river, together with many laterals.

Earth Roads Show No Care

Some earth road is traveled over and this carries the usual criticism that generally goes with that condition. Even where a measure of care is given, it is generally not of the comprehensive type and is then, at its best, not worthy the title. Even the King drag seems to be an unknown quantity despite its quality for just such sections; turning prairie soil into very good highways.

Through it all there prominently stands out that one big neglect which is constant in most road work not done by highway engineers—drainage, surface and side, and then more drainage. Very little side ditching is to be seen. Crowning on safe and sane lines is equally conspicuous by its absence. When the roadway has not two parallel water troughs, more generally known as wheel ruts, then it has one central water trough the entire width of the traveled portion. The cross-section top line is concave instead of convex.

Now look at Iowa: Crossing the State of Iowa in fair weather is delightful touring where the log-dragged roadway prevails.

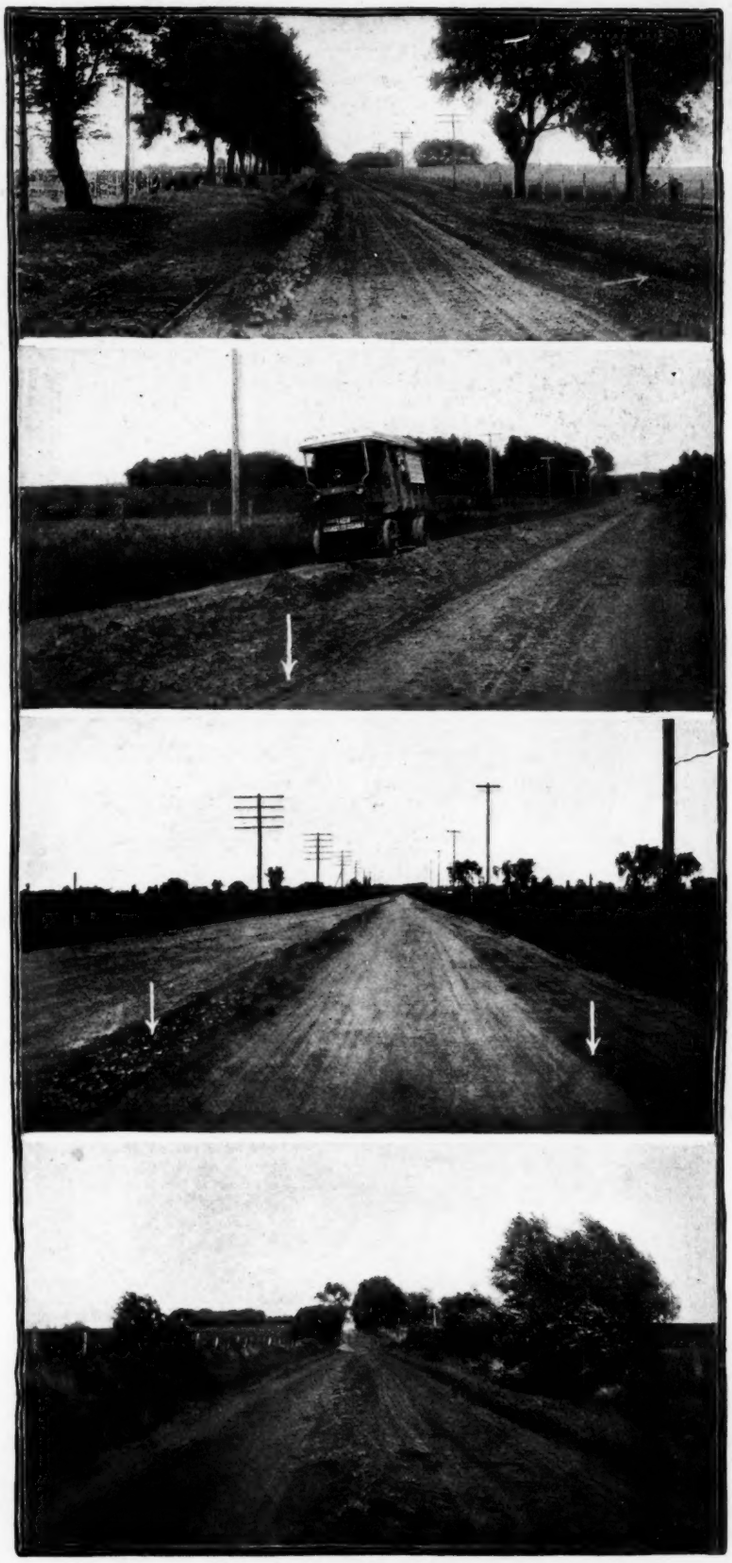
During a rain period it is always safer, when not obligatory, to abandon any attempt at further progress. This applies to nearly all of any route taken, with the obvious exceptions of in or near some of the larger cities.

Mutual road associations in the farming sections, throughout the state, are doing much excellent work to overcome the troubles that are inherent with Iowa's gumbo—clayey—roads. Dragging is the one and chief means used. Where intelligently applied this gives the contour of an engineered stone highway, with its reasonable crown and side drainage, thus taking care of rain precipitation within the limits of the soil.

Soil Limitation Delays Travel

It is this soil limitation that delays and at times suspends travel during and for a time after a heavy rainfall. The length of time varies in different localities. Where there is some grit, such as an admixture of disintegrated lime rock, travel can generally be resumed in from 1 to 3 hours, depending on the amount of precipitation. Where vegetable mold makes up the soil in entirety then the time of hang-up is extended by a large multiple.

However, it is to be understood that proper grading and immediate dragging after each rain does wonders and any analysis of the situation can only be approximate by just so much as either or both of these items of caretaking are applied. **Be it remembered that gumbo has the peculiar quality of quickly drying out from sun and wind. The rapidity with which the surface loses its slippery qualities depends almost entirely on the amount of previous dragging, combined with crowning and side drainage, and the least loss of time in redragging after the rain has ceased.**



Top—A loose stone roadway of many ruts and pockets. On the right there is some side drainage that is intermittent. At some time a crushed stone coating has been so carelessly put on that wheel traffic started zig-zag ruts.

Upper Middle—A wheel scraper has torn the vegetation and roots from each side, piling them into the center. The elements may some day flatten the center but only by washing it back to the sides. In the meantime two rut roads are formed in each side.

Lower Middle—The loose stone center gives a double highway not needed for the amount of traffic along here. The uncertainty of the earlier travel, when the surface material was first put on, as to what part of the extreme width to use, is well portrayed in the tortuous loose center of the background. Enough material has been used to give at least 50 per cent. more mileage at the same cost.

Bottom—Another instance of scraping the sides to the center. In the foreground are two soft earth (gumbo) roadways. In the center of the illustration the two converge and become a single roadway on the left of the scraped surface.

With this hill too much work has been put into widening the cut and not enough into reducing the grade. The grade is so stiff that local traffic cuts back and forth from side to side to relieve the horses, as shown by the various and curving ruts.

This is not a hill but a sharp cross ridge that has all the effect of a two-way grade. It will be noticed in the left foreground that a lot of labor has been expended without definite results. The same amount of work would have cut off the cross ridge, with consequent improved going in both directions.

A plain dirt road good only in dry periods. There are side drains but they are heavily grown with grass and weeds along the edges of the road prevent a quick discharge of surface water. Only little work has been put onto the road, but none of it lost in trying for overwidth. That it is wide enough is shown by the positions of the two vehicles, their separation being more than needed for safe driving.

One of the puzzling factors that forces itself upon the automobile tourist is the opposites encountered in the use and non-use of the King drag in adjoining sections of the state. You travel along on a natural soil road that is kept up to the minute by dragging. It is well crowned and side drained. Driving over it is a joy and a new delight in experiences to those who have only known macadam roads. It is wide enough for three or four teams and by virtue thereof there are no defined ruts of wheel or animal travel.

Old Methods Prevail in Country

Soon there is encountered a roadway that has marginal limits of enough width, but the old-time methods of country road making prevail. All the soil and growth along the sides has been placed in the center of the roadway. Here is always the constant condition of two parallel roads divided by a barrier and each showing all the ill effects of travel in one path.

As likely as not the next experience is with the highway well kept, by dragging, that immediately adjoins one that is the veriest frontier trail. This latter comes down to being just two ruts through the grass and weeds, often with a high bank on one or both sides and never with a side ditch. If the soil is gumbo this condition of roadway might have one advantage. During or after a rain one could travel along the grass sides, provided there were not frequent high banks or low sides.

South Has No Frosts to Fear

Not all natural roads in Iowa are gumbo or gritty clay. There is now and then found stretches of sand. With these, so far as experienced, little has been attempted in the art of bettering. To any who have motored over sand-clay roads of the Atlantic coast states, in the South, the thought comes, cannot a lesson be taken from them? The application of the query has to do with both the sand and the gumbo sections, so treacherously slippery from rain.

The usual answer given is that the South has no frosts of moment to contend with and that Iowa's deep frosts would mean an upheaval and general disturbance each spring. The reply may seem well based and fairly logical, but it can never be a perfect answer until the scheme of construction has been well tried. Even then not a definite answer could be rendered until a number of experiments had been conclusively tested.

Frost can only come from moisture and then in direct proportion to that moisture. Given a sand-clay construction with snow to cause moisture and assume frequent thawings to bring about the cause. First we must so proportion the sand and gumbo that the former will not be in large enough quantity

to readily absorb the snow water. Next the roadway must be crowned to properly shed the results of the thawings. A further refinement could be inaugurated by blanketing, or roofing, the highway as is done in Massachusetts, with an oil binder. This would insure a rapid shedding of all moisture, rain or snow water, and prevent surface disintegration.

With either there must be side ditching of correct proportions to carry away the water that it may not, by standing, finally seep through the ditch sides and under the roadway there to freeze and cause an upheaval in the spring break-up. This might particularly occur at the sides of the newly made road section.

Slimy Quality of Gumbo

Whether or no a definite sand-clay construction is entered into it would be well worth the doing that a sandy section and a gumbo section exchange their superfluous quantities. Certainly the gumbo sections would be the gainers in rainy weather by just so much as they reduced the impassable slime surface of their roads by the admixture of grit used in their construction.

With it all there ought to be no let-up in the applied use of the log drag. It will continue to be the best means to keep the roadway in a most excellent condition by maintaining the surface of the mixture of sand and gumbo, whether the mixing is done as an engineering condition or as an impromptu affair.

Abbott Strengthens Finances

DETROIT, MICH., April 23—*Special Telegram*—Negotiations which have been under way for some time are progressing very satisfactorily for the strengthening of the financial position of the Abbott Motor Co. by the taking in of some of the larger creditors as stockholders. This plan will provide additional working capital for the carrying on of the business. It is substantially a co-operative proposition whereby the assets are placed in a trust, and making the creditors amply secured. According to M. J. Hammers, general manager of the Abbott company, the concern has always been hampered by lack of working capital and the present scheme will remedy this difficulty. The concern is on a paying basis and at the present time marketing about 250 cars a month, orders coming in as they should although no definite statement of the new interests involved in the Abbott company has yet been made. The officers and present management will be left substantially the same under the new plan. The creditors taken in will of course be represented on the Board of Directors. With this trust agreement it is stated that the creditors will take practically no risk since it is a going concern.

No attempt of any kind at road making; travel alone defines the roadway of two ruts divided by a grass center. In wet weather all the water from the high fields on the right crosses the road to the low fields on the left. The rank growth in the left foreground shows how long the water stands. During wet periods the road is more or less flooded and becomes passable only after long dry periods.

A gumbo road just commencing to dry out two days after a rain. On the extreme right and left are deep side drains, but the lack of crowning prevented the water from running off as it fell, making heavy going in the meantime. The right hand side is yet miry. Travel on the left has squeezed out most of the moisture, at the same time forming deep ruts to hold the next rain. Travel will then keep to the right which has become sunbaked in the meantime. And so it goes.

This gumbo road has been scraped and a slight attempt made at crowning, but has no side drains. Rain cannot readily run off and the surface becomes treacherous. Too much attention to width has not only cut down the work on the first making, but also presents quick dragging after rain

Receiver for Schacht

Creditors of Company Spring Surprise—Assets Exceed Liabilities by $400,000—Alleged Wrangle of Officers

CINCINNATI, O., April 21—After a wrangle between directors and stockholders, previous to which the participants of a stockholders' meeting had tried to put the business of the Schacht Motor Car Co., of this city, into the hands of a creditors' committee, Wallace M. Gray and Attorney Dwight Marfield filed suit in the Common Pleas Court asking for a receiver and a judgment for $10,000. John H. Miller, holding a note of $8,551.74, payable February 2, 1913, and notes aggregating $11,000 and payable February, 1914. Miller is also the indorser of a note for $20,000, due on April 9, 1913. Creditors demand payments of their claims and Miller alleges that differences which have arisen between the directors of the company indicate a possible squandering of the assets unless a receiver were named. Arthur Stem, secretary of the company, answered the petition. The suit was presented to Insolvency Judge Warner, who appointed John F. Deitz receiver, fixing his bond at $50,000.

While it was known for some time that the Schacht company was in difficulties, the action of the creditors came as a surprise. The recent floods made things worse for the company, tying up material to be received and shipped.

The capital of the company is $500,000, $350,000 preferred and $150,000 common stock. Of the preferred $314,000 has been issued, while $98,100 of common stock are outstanding. The real estate assets are about $136,000, but mortgaged to the extent of $110,000, while machinery and equipment on hand are worth $200,000; accounts amount to about $60,000, and notes to $6,000. Miller states, however, that a fair valuation shows the assets to exceed the liabilities by about $400,000.

Morgan Sued by Bryant Spring Remover

PROVIDENCE, R. I., April 19—Justice Brown, in the U. S. District Court here heard arguments in the case of the Bryant Spring Remover Co., New York City, against Bernard Morgan, of this city, alleging infringement of the complainant's patents and demanding an injunction. The court gave the parties 3 weeks in which to file briefs.

No Oral Hearings on Tariff Bill

WASHINGTON, D. C., April 19—That the Senate finance committee will not hear oral arguments on the Underwood tariff bill when the measure comes to the upper house of Congress is the admission made by Democratic leaders. The matter was debated at length in the Senate this week at which time many Republican senators declared they were in receipt of thousands of requests from manufacturers all over the country asking for permission to be heard on the tariff schedules. It is possible that the finance committee will permit manufacturers to file briefs, but this is doubted by close followers of the tariff measure.

To Sell Columbus Buggy Co. May 14

COLUMBUS, O., April 19—The Federal Court at Columbus has ordered the sale of all of the property of the Columbus Buggy Co., Columbus, O., May 14, excepting bills receivable and consigned goods. The property will be sold at public auction upon that date in four parcels known as A, B, C and D.

Parcel A consists of all real estate and leases both at Columbus and in Minneapolis, where a branch house was operated. The real estate in Columbus is on the tax duplicate at $218,000 and the upset price on this property is $100,000.

Parcel B consists of all machinery and merchandise, including equipment and plans, and the upset price is fixed at $75,000.

Parcel C consists of the Los Angeles branch, which is consigned goods only, and the upset price is fixed at $30,000. Reports show that this parcel has already been sold.

Parcel D consists of the San Francisco branch of consigned goods and the upset price is fixed at $6,000.

It is said the creditors' committee has completed arrangements for bidding in the property at the upset figures in case there are no other bidders. The plant on Dublin avenue is now in shape for operation and most of the damage caused by the recent flood has been repaired.

NEW YORK CITY, April 21—The Appellate Division of the Supreme Court here affirmed the decision of the court, in the case of Thomas Muller against the Pope-Hartford Auto Co., which was the local agent of the Pope Mfg. Co., at that time.

Fedders Incorporated with $400,000

BUFFALO, N. Y., April 23—*Special Telegram*—The Fedders Mfg. Co., Inc., filed papers of incorporation yesterday. It will manufacture automobile radiators and other sheet metal products. The officers of the company are: Theodore C., Christian W., John M. and Louis F. Fedders of this city.

AKRON, O., April 19—Another reduction of truck tire prices took place during this week, when the Goodyear Tire & Rubber Co., announced a 10 per cent. cut on the quotations of its commercial tires. This is the second reduction of this nature during 1913, the first having taken place at the time of the National shows.

Automobile Securities Quotations

The general tone of the market for the past week was steady. Only fifteen quotations showed any difference at the end of the week as compared with last week, while twenty-eight maintained their level. The biggest change for the week is to be found in Goodyear common which jumped 30 points. Next to this is Firestone common which is 10 points higher on the bid price and 15 on the asked. Pope preferred dropped 7 points and the common dropped 3. The rubber stocks continue to be the most variable but are exceedingly steady in these as compared to conditions during the recent strike. Swinehart gained 4 points during the week while Fisk and U. S. Rubber each fell off 2 points.

	1912 Bid	1912 Asked	1913 Bid	1913 Asked
Ajax-Grieb Rubber Co., com	..	..	150	165
Ajax-Grieb Rubber Co., pfd	..	..	93	99
Aluminum Castings, pfd	..	..	98	100
American Locomotive Co., com	43¼	44	36	37
American Locomotive Co., pfd	108½	108¾	103	104
Chalmers Motor Company, com	..	..	125	132
Chalmers Motor Company, pfd	..	..	98	102
Consolidated Rubber Tire Co., com	11	20	17	19
Consolidated Rubber Tire Co., pfd	20	40	60	75
Firestone Tire & Rubber Co., com	258	262	275	285
Firestone Tire & Rubber Co., pfd	108	110	104	106
Fisk Rubber Co., com	..	..	..	..
Fisk Rubber Co., pfd	..	..	..	100
Garford Company, preferred	..	..	99	100½
General Motors Company, com	35½	36	26	27
General Motors Company, pfd	74	74½	73	74½
B. F. Goodrich Company, com	..	..	34½	35½
B. F. Goodrich Company, pfd	..	..	95	98
Goodyear Tire & Rubber Co., com	238	241	330	340
Goodyear Tire & Rubber Co., pfd	108	110	100	101½
Hayes Manufacturing Co	..	..	..	90
International Motor Co., com	..	..	5	10
International Motor Co., pfd	..	..	25	40
Lozier Motor Company	..	..	..	20
Miller Rubber Company	..	..	160	170
Packard Motor Company	104	107	98	103
Peerless Motor Company, com	..	..	35	45
Peerless Motor Company, pfd	..	..	95	100
Pope Manufacturing Co., com	35	38	16½	18½
Pope Manufacturing Co., pfd	75	78	55	58
Reo Motor Truck Company	8	10	11¾	12¼
Reo Motor Car Company	23	25	21	22
Rubber Goods Mfg. Co., pfd	100	105	100	105
Studebaker Company, com	..	..	28	30
Studebaker Company, pfd	..	..	89	93
Swinehart Tire Company	..	..	92	95
Maxwell Motor Co., com	..	..	5	8
Maxwell Motor Co., 1st pfd	..	..	50	70
Maxwell Motor Co., 2nd pfd	..	..	20	30
U. S. Rubber Co., com	56	56½	64	64½
U. S. Rubber Co., 1st pfd	113	113½	105	106½
White Company, preferred	..	..	107½	109
Willys-Overland Co., com	..	..	62	68
Willys-Overland Co., pfd	..	..	90	96
Portage Rubber Co., com	..	..	38	42
Portage Rubber Co., pfd	..	..	90	94

One Thousand Cars a Day

Detroit Manufacturers Ship Over 250 Freight Carloads of Automobiles Daily —Dealers Plan National Organization

DETROIT, MICH., April 19—Detroit manufacturers are shipping from 250 to 300 freight carloads of automobiles per day at the present time. This is the busiest shipping season of the year and the output shows a material increase over January and February shipments. During January some 20,000 automobiles were sent out, while for February somewhere in the neighborhood of 25,000 were shipped.

It is rather difficult to arrive at an average for the number of automobiles contained in each freight car, but, considering both large and small machines, the average number per freight car is about four. On this basis the probable daily output now runs from 1,000 to 1,200 machines.

If the present rate of shipment were continued throughout the month, April would show a total in the neighborhood of 30,000 machines going out to meet the world's demands from the center of the industry. But greater daily shipments are expected, and doubtless the figure will run close to 40,000.

So far, railroads and the Detroit office of the National Association of Automobile Manufacturers' Traffic Bureau have been able to supply the freight cars necessary for the automobile shipments, and while a few weeks ago it was thought that a freight car famine was imminent, the present rolling stock supply appears to be able to take care of the situation.

It seems to be the general sentiment of the manufacturers and also of the railroads that there will be no shortage this year after all. The Detroit Traffic Office is receiving the hearty co-operation of the car makers and its records show that through its efforts the freight cars are being returned to this territory after taking the automobiles to their destinations.

Plan National Dealers' Organization

NEW YORK CITY, April 20—An informal meeting of motor car and accessories dealers was held in this city today for the purpose of discussing the advisability of a national dealers' association to look after the best interests of motor car and supply dealers throughout the country. It was a general consensus of opinion that such an organization would be of inestimable value and it was definitely decided to take up the matter of such an organization with dealers in all sections of the country. Providing there is a satisfactory response it is purposed to call a meeting in Indianapolis, on Thursday, May 29, the day previous to the 500-mile race at which dealers from all parts of the country would attend and discuss ways and means of perfecting such an organization. Frederick H. Elliott, who has been connected with organization work with the American Automobile Association and the Touring Club of America, is working up the plans for the May meeting. He has already taken it up with many dealers' organizations and has met with favorable reports from practically every section of the country.

Such an organization would have a wide field of activity which would include a system of credits, the regulations of local shows and scores of other problems which the dealer is confronted with.

McCue Co. Adds $300,000 in Reorganization

BUFFALO, N. Y., April 21—The McCue Co., Buffalo, N. Y., completed a reorganization and a refinancing last week, adding $300,000 in cash for working capital.

The following prominent business men of Buffalo have been added to the directorate: Ralph Plumb, vice-president and general manager of the Buffalo Bolt & Nut Co.; R. G. Wright, president of the Reed Mfg. Co., Erie, Pa.; Samuel Ellis, of the Manufacturers' & Traders' Bank, Buffalo, and Edward McM. Mills, of the law firm of Rogers, Locke & Babcock.

These four gentlemen, together with C. T. McCue, form the directorate. The officers elected are: C. T. McCue, president; Ralph Plumb, vice-president; Samuel Ellis, treasurer; Edward McM. Mills, secretary. C. H. McCullough, Jr., vice-president and general manager of the Lackawanna Steel Co., becomes one of the heaviest stockholders in the reorganization.

W. T. Evans was secured as production and general manager of the new company. Mr. Evans was formerly with the Metal Products Co., of Detroit., which concern he has managed since its inception.

Orders have gone forth for machinery and equipment sufficient to place the plant on a 1,000 wheels per day production capacity by the first day of August. Arrangements have been made at this writing to practically double the August capacity of 1,000 wheels within 3 or 4 months from that time.

CHICAGO, ILL., April 21—The Standard Oil Co. of Indiana announces that the trademark name for its new fuel will be Stanolind Motor Spirit, although it will be familiarly known as Motor Spirit. It was found that in England "motor spirits" is used to designate fuel, which prevents the use of the name here as a trademark.

RACINE, WIS., April 19—At the annual meeting of the board of directors of the J. I. Case T. M. Co., of Racine, Wis., the following officers were elected: President, Frank K. Bull; vice-president, Frederick Robinson; secretary, Richard T. Robinson; treasurer, F. Lee Norton.

NEW YORK CITY, April 22—Three companies have declared stock dividends during the past week. The Chicago Pneumatic Tool Co. will pay 1 per cent. on its common stock on April 25, the Russell Motor Car Co. will pay 1 3-4 per cent., the regular quarterly dividend, on May 1 and the Vacuum Oil Co., 3 per cent., payable on May 15; the last dividend declared by the Vacuum company was 3 per cent. paid on October 31, 1912.

Market Changes of the Week

More active trading pervaded the markets this week. Tin experienced a decline of $.18 per hundred pounds. The demand has decreased, speculative interest and dealers alike complaining of the extreme dullness. In the London market trading was of very fair volume, with closing cables reporting a net decline of $.30 on spot, and an advance of $.10 on futures. The copper markets are dull, and the demand of very small proportions. The great display of strength and predictions of further advances in copper appears to have been dissipated. Even the statement of a leading authority that consumption is surpassing production, and which is scouted in well informed circles, appears to be of non-effect. The lead market is firm and increasingly active for some days. Lead is calling at $4.35 per hundred pounds. Both the Pennsylvania and Kansas petroleum prices remained constant this week and firm. Pennsylvania calling at $2.50 per barrel and Kansas at $.88. Cottonseed oil rose $.12 per barrel. The consuming demand is very good. Lard oil rose $.01.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Change
Antimony, lb.	.07⅝	.07⅝	.07⅝	.07⅝	.07⅝	.07⅝	.....
Beams & Channels, per 100 lbs.	1.61	1.61	1.61	1.61	1.61	1.61	.....
Bessemer Steel, ton	29.00	29.00	29.00	29.00	29.00	29.00	.....
Copper, Elec., lb.	.15½	.15½	.15⅝	.15⅝	.15⅝	.15⅝	+.00 1/10
Copper, Lake, lb.	.15⅝	.15⅝	.15⅝	.15⅝	.15⅝	.15⅝	+.00 1/40
Cottonseed Oil bbl.	6.95	7.00	7.08	7.09	7.07	7.07	+.12
Cyanide Potash, lb.	.19	.19	.19	.19	.19	.19	.....
Fish Oil, Menhaden, Brown.	.33	.33	.33	.33	.33	.33	.....
Gasoline, Auto, 200 gals.	.22¼	.22¼	.22¼	.22¼	.22¼	.22¼	.....
Lard Oil, prime.	.94	.94	.94	.94	.95	.95	+.01
Lead, 100 lbs.	4.35	4.35	4.35	4.35	4.35	4.35	.....
Linseed Oil.	.47	.47	.47	.47	.47	.47	.....
Open-Hearth Steel, ton	29.00	29.00	29.00	29.00	29.00	29.00	.....
Petroleum, bbl., Kansas, crude.	.88	.88	.88	.88	.88	.88	.....
Petroleum, bbl., Pa., crude.	2.50	2.50	2.50	2.50	2.50	2.50	.....
Rapeseed Oil, refined	.68	.68	.68	.68	.68	.68	.....
Silk, raw, Italy.	....	4.35	....	....	4.35	4.35	.....
Silk, raw Japan.	....	3.75	....	....	3.75	3.80	+.05
Sulphuric Acid, 60 Baumé.	.90	.90	.90	.90	.90	.90	.....
Tin, 100 lb.	49.63	50.00	50.05	50.05	49.50	49.45	—.18
Tire Scrap.	.10	.10	.10	.10	.10	.10	.....

Massachusetts Motorists Score First Point

Prevent Senator Johnson from Recommitting Truck Bill

BOSTON, MASS., April 21—The committee representing the motor truck users and dealers, which has been working on the proposed legislation to increase the fees on commercial vehicles to $5 per ton, was successful yesterday in its first move in opposition to the measure when Senator Johnson, chairman of the committee on roads and bridges, moved in the Senate today to have the bill recommitted to his committee.

During the past few days the truck representatives have been very busy working up opposition since they learned that instead of the bill calling for $5 for 1 ton and $2.50 for each additional ton, that was agreed upon in conference with the highway commission, and later agreed upon before the legislative committee, had come out of that body to the Senate calling for $5 for every ton.

With practically but 1 day in which to secure signatures against the measure, the committee got more than 1,000 names from all classes of people from all over the state, and these petitions were brought to the state house today to be put in if the bill came up for consideration as it was scheduled. Meanwhile letters were sent to some of the members of the Senate calling their attention to the matter.

A committee, comprising President Day Baker, of the Electric Vehicle Club, and John B. Sullivan, Jr., counsel for the Boston Commercial Vehicle Dealers' Association, met the officers of the Central Labor Union Sunday and had a conference on the matter. The labor officials took the matter up and agreed to lend their opposition to the measure.

Today Mr. Baker, Mr. Sullivan, James B. Fortesque, of the Massachusetts State A. A., James T. Sullivan and G. S. Draper visited the state house and talked with some of the members of the Senate. Chairman Johnson then agreed to have the bill recommitted to the committee for a further hearing. He said that the hearing would be held either May 6 or 8, as the committee is going to make a tour of the western part of the state next week.

That was satisfactory to the truck representatives. It was then decided to call a meeting next Thursday of all those interested in the commercial industry at the Boston City Club at which plans will be made to attend the legislative hearing and give facts and figures to support the contention of the motor interests that the proposed legislation is a blow at the indusry.

The National Association of Automobile Manufacturers last week took a hand in the Massachusetts fight against increased taxing of commercial vehicles by circularizing the state with its resolutions, as follows:

"We are emphatically of opinion that the enactment of any legislation increasing taxation of commercial vehicles or imposing any restrictions other than present police regulations and existing general state automobile laws is unnecessary in the public interest and will retard the development of motor trucking and the growth of the motor truck industry.

"As other states have a habit of copying the legislation of Massachusetts and other Eastern States, a very dangerous and pernicious precedent will be established if these bills are allowed to become laws, and, as a result, years of agitation along this line throughout the country may confidently be expected.

"A critical situation confronts the motor truck industry at this time. Every legitimate means should be employed at once to forestall the entering wedge by preventing all objectionable legislation during the development stage of the industry.

"Any fee imposed on motor trucks in excess of the cost of registration as a police protective measure, is double taxation, class legislation and therefore unconstitutional.

"There have been 'wide-tire' laws in these states for years to limit the weight per inch of tire width but which never have been enforced. The motor truck should not be singled out now for attack and another law placed in the statutes to become a dead letter.

"No reliable information has been advanced to show that motor trucks, with their broad rubber tires, do any damage to streets and roads independently of other vehicles and in undue proportion.

"The proposed laws will tend to restrict commerce and industry by destroying part of the economic advantage of the commercial automobile.

"The greatest factor in the progress of the United States has been rapid and cheap transportation by rail and water; the next great forward step is quicker and cheaper transportation by highway.

"Obstacles placed in the way of the motor truck will prevent further reduction in the cost of haulage and delivery and tend to maintainn the high cost of living, thus affecting all the residents of the commonwealth.

"Economic conditions and commercial competition must eventually determine the capacity of motor trucks, which will be governed by the relative cost per ton mile of operation.

"Instead of putting sticks in the wheels of progress by limiting traffic to present road conditions, the roads and bridges should be improved to meet traffic conditions, just as the railroads after adopting heavier locomotives and larger cars to move greater tonnages in single trains, found it necessary and economical to reconstruct their road beds and tracks to bear the heavier traffic.

"Legislation that tends to decrease the demand for motor trucks and automobiles will affect adversely one of the largest and best industries of the country. Estimates based on the United States Census of 1910 show that more than 340,000 employees are engaged in the manufacture of motor vehicles and their parts today. Only 1.2 per cent. of these are under sixteen years of age, and only 1 per cent. are women. The rate of wages is unusually high in the trade, and working conditions are the best, most of the factories being of the newest and most approved construction, and the occupations healthful. An industry of this kind should be encouraged as much as possible for the benefit of the working people, instead of being discouraged by objectionable legislation."

Smoke Law Held Constitutional

CHICAGO, ILL., April 21—The Supreme Court of the State of Illinois on Saturday handed down a decision which upholds the constitutionality of the smoke law. There is nothing in the state code which enables the authorities to arrest drivers whose motors are emitting smoke. The city of Chicago passed such a law, but one of the municipal judges held that the city had no right to enact such a measure. Since that time the police have kept their hands off, but now that the Supreme Court has handed down its decision it is anticipated that the city law will be rigidly enforced. The case was one against the Walden W. Shaw Co., operating taxicabs. The local liverymen, fighting the law, used Shaw for the test case.

South Dakota Has New Law

PIERRE, S. D., April 17—The new motor law for the state has some peculiar provisions which place the instrument in a class by itself. It becomes operative July 1. Applicants for automobile licenses must file registration blanks with the county treasurer, who is to file the applications with the secretary of state, who will forward to the owner two license tags for each application, one to be displayed in front and one in the rear of the machine. Duplicates to replace lost tags may be obtained for $1 each.

The license fee from July 1 to December 31 is to be $3. Thereafter the annual fee shall be $6. After a vehicle shall have been licensed for 5 successive years, the fee is to be one-half the regular rate. Vehicles registered any time between July 1 and January 1, 1914, will cost the owner the full $3 each for tags.

Usual speed and signal requirements are included in the law, excess of 25 miles an hour being presumptive evidence of fast driving in case of an accident. When a passing animal is seriously frightened, the owner of the motor vehicle must stop his engine. Drivers must be more than 15 years old, unless accompanied by the automobile owner. A maximum of $500 or imprisonment of not more than 2 years is provided for first conviction on the charge of leaving an injured person without giving name and address, or in case a police officer is not there, or failing to report to a police or peace officer. Upon conviction a second time for this offense or of the misdemeanor of being intoxicated while driving, the charge is felony and the penalty is imprisonment from 1 to 5 years. Upon recommendation of the trial court, which must report all convictions, the secretary of state may revoke the license of the offender's car.

Kansas to Tax Automobiles

TOPEKA, KAN., April 19—The new Kansas automobile tax will yield about $120,000 a year for use on the rural highways of the state, according to the estimates of Secretary of State Charles H. Sessions. The law becomes effective July 1 next, and it is expected that most of the money will be in the hands of the county treasurers before that time. The tax amounts to $5 a year on automobiles. Of this amount the secretary of state, under whose direction the administration of the law is placed, receives 75 cents for the expenses of administration, providing number tags, etc., and the clerical work required in registering the machines.

There are about 26,000 automobiles in the state.

The tags will be ready for distribution June 1. Information required by the state upon which number plates will be furnished includes the name and address of the owner, the name, style, year of manufacture and horsepower of the machine licensed.

Twenty Entries for Indianapolis Contest

Mercedes-Knight and Mercer Team Latest to Enter

THERE are now twenty entries for the Indianapolis Speedway 500-mile Race May 30. The formal entry of three Mercer cars, with De Palma, Bragg and Wishart driving, has been received. An unexpected entry is that of a Mercedes-Knight made by E. C. Paterson, the Chicago sportsman, who entered the Mercedes driven by De Palma which won the Elgin National a year ago. The Mercedes-Knight, known as the Belgium Grand Prix racer of last year, will be driven by Pilette, the Belgian agent for this car, who is expected to leave Brussels early in May for America. The car is now being overhauled in the Mercedes plant.

The Mercer entry includes two cars of 447.9 cubic inches piston displacement with a bore and stroke of 4.8 by 6 3-16 inches, and one car of 299.7 cubic inches, with dimensions of 4.37 by 5. Caleb Bragg and Ralph De Palma will pilot the first two, while Spencer Wishart will handle the third. All of them carry four cylinders. The delay in the entry of the Mercer team was made necessary by the fact that the factory engineers first wanted to give the 447.9-inch motors a thorough try-out before definitely pinning their faith to them. The largest the Mercer people have raced heretofore have been cars of the 299.7 classification. This is the size Hughes piloted to a third in the Indianapolis race last year.

Valuable cash prizes have already been offered by the accessory people. The Bosch company has posted $1,000, $500 to the winner, $300 to second and $200 the third. The money being given conditional that Bosch magnetos are used.

The Hartford Suspension Co. have offered three prizes; $250 to the winner, $150 to second and $100 to third, conditional if they are fitted with Hartford shock-absorbers.

Homer & Motsinger has offered $1,000 each to every driver finishing inside the money with its carbureter.

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SAVANNAH, GA., April 21—Entry blanks for the Grand Prix race have been put in the mails, and as soon as the blanks for the Vanderbilt Cup, and the other small races are approved by the A. A. A. these will be distributed. This year the numbers of the entrant in the different races will be determined by the order in which the entries are received. No. 1 entry running No. 1 in the race. Where more than one car is entered by the same concern they will not receive consecutive numbers.

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CHICAGO, ILL., April 21—The Elgin Automobile Roadway Association has already begun work of improving the 8-mile circuit on which the Elgin National and other races will be handled August 29 and 30. One of the latest entries received is the Belgian Grand Prix Mercedes-Knight, entered by E. C. Paterson, of this city, whose entry won the National Trophy last year.

There is at present a total of eight entries in the Chicago-Boston non-stock reliability, June 25 to 29.

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Official A. A. A. Reliability Itinerary

MINNEAPOLIS, MINN., April 21—The official itinerary for the A. A. A. national reliability tour from the Twin Cities to Glacier Park Station, Mont., issued by Chairman C. E. Dutton, of the touring board, showed a distance of 1,233 miles between those two points. Leaving Minneapolis on July 11, the next stop will be Alexandria, 144.4 miles. Starting out from here the next day the tourists will cover 123.8 miles, in all 268.2, reaching Fargo. On July 13, the next station will be Devil's Lake, about 66.5 miles. From here the tourists will start out on July 16 and go to Minot, averaging about 68.8 miles. Williston is to be the next stopping place after Minot, a mileage of about 89 miles, reaching this place on July 17. After Williston comes Glasgow, about 63.9 miles, which will be reached on July 18. Havre is the last town, about 98 miles from Glasgow, ending the tour on the 19th.

Louis W. Hill, chairman of the Board of the Great Northern Road, is planning a spectacular finish of the tour. He will have stationed on the mountain peaks along the picturesque Rocky range just back of the world's unique log hotel at Glacier Park station, a score of men who at a given signal will touch off tons of red, white and blue Roman fire. The striking illumination of the mountain scenery will be a spectacle without question the greatest thing in connection with the tour, with the possible exception of the reception by 3,000 Blackfeet Indians as the motorists enter the reservation. After driving days over the prairies, the last night of the tour at the entrance to the Rockies is expected to be an event long to be remembered.

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Chicago Truck Run Abandoned

CHICAGO, ILL., April 21—The motor truck demonstration which the Chicago Motor Club undertook to promote for April 28-30 has been abandoned, it was announced today, because the concerns which handle the larger commercial vehicles were lukewarm on the proposition and the prospective entry list was not representative of the industry.

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INDIANAPOLIS, IND., April 21—Members of the Indiana Automobile Manufacturers' Association met at the Claypool Hotel in Indianapolis on the evening of April 15 to discuss arrangements for the Indiana-Pacific Tour, which will start from Indianapolis July 1. There have been fifteen entries for the tour and many more are expected.

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COLUMBUS, O., April 21—Because of the damaged condition of the bridges in many parts of Ohio and Indiana due to the recent floods the Ohio State Journal Reliability contest, which was scheduled for April 29 and 30 and May 1, has been postponed until June 16, 17 and 18. The route has also been changed owing to the flood and the tour will be from Columbus to Detroit, to Cleveland, to Akron and back to Columbus.

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Many Dealers at Pittsburgh Show

PITTSBURGH, PA., April 19—The pleasure vehicle and commercial truck show which opened in the big East Liberty market building April 5 and which closed tonight has been in many respects one of the most successful shows ever held in Pittsburgh. It was put on by the Automobile Dealers' Association of Pittsburgh, Inc., of which W. N. Murray is president.

Dealers report an unusually large number of out-of-town agents were represented in the crowds.

The officials of the show gave out the following data:

The number of exhibits was 150. Individual pleasure cars displayed numbered 160 and trucks fifty.

Number of high-powered electric lights, 8,000.

Square feet of mirrors in chandeliers and set in lattice work, 500.

Square feet of lumber used as ground work for decorations, 75,000.

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RACINE, WIS., April 21—Every motor car and motorcycle dealer in Racine County was represented in the 2-day motor show given under the auspices of Racine city dealers in Lakeside auditorium on April 18 and 19. It was the first motor show to be held in Racine, and the attendance was much larger than anticipated.

Ohio Senate vs. I.W.W.

Radical Practices Condemned—Strike Could Have Been Averted by Confabs

COLUMBUS, O., April 17—Condemnation of the teachings of the I. W. W. and criticisms of practices of employers in the rubber industry form the keynote of the report of the Ohio Senate investigating committee on the Akron strike. Sabotage, as taught by the Industrial Workers who conducted the strike, is declared by the committee to be alarming and dangerous and closely akin to anarchy. Criticism of the employers is concerned especially with the "speeding" of employees and with the air of aloofness maintained by employers toward their employees. The committee opines that if the rubber companies had been willing to confer with their employees at the beginning of the controversy the strike might have been averted.

The committee, comprising Senators Green, Seward and Howard, is unanimous in its findings, excepting only in reference to the tariff on manufactured rubber goods. The two Democrats on the committee hold that the present duty of 45 per cent. is prohibitive and should be greatly reduced. Senator Howard dissents from this.

The committee begins by commenting critically on the attitude of the employers originally in refusing to treat with the employees and to confer with the State Arbitration Board. It finds that in the rubber factories there is a general fear on the part of the employees to make complaint owing to the belief that dismissal might result. The committee members hold that rules should be posted in all the factories advising employees to report their grievances. It is held that the failure of the rubber companies to correct grievances is the cause of a general feeling of discontent among the employees.

The committee finds that employees at night are required in some cases to work as long as 13 hours and this practice it holds unjustifiable. Women employees are paid between $5 and $12 a week, in exceptional cases less or more than this amount. The wages generally paid in the rubber factories are found to compare favorably with other industries and in the tire finishing department to be better. On the other hand, the earnings of the rubber companies are found to be large and to warrant high wages. The rubber factories themselves are found to be airy and well ventilated.

No conclusive evidence of the existence of blacklisting was found by the committee, although there was evidence showing that before employing applicants, the companies take a minute physical description and then call by telephone the company where the applicant was previously employed. The committee found instances wherein an applicant was rejected after the employer had telephoned to the company of last employment.

The condemnation by the committee of the principles of the Industrial Workers is scathing. However, the committee finds that a large majority of the rubber workers joined the I. W. W. solely to win the strike and that they did not believe and in many cases did not even know the principles taught. The committee tells the senate that the I. W. W. do not believe in contracts between employers and employee and that they encourage "sabotage," or the principle which teaches the workmen to shirk his work, turn out a poor product or injure machinery when he cannot remedy his condition by other means. The committee holds this teaching dangerous and a matter of grave concern to both the state and nation. It finds also the I. W. W. teaching against labor contracts is a menace. It holds that the interference of the I. W. W. injured rather than helped the cause of the rubber workers.

Postal Truck Contracts Held Up

WASHINGTON, D. C., April 19—The fact that the contracts for furnishing the Post Office Department with 100 motor cars for use in the parcel post service are being held up is causing some little uneasiness among the successful bidders. Approval of the contracts was one of the latest official acts of Postmaster-General Frank H. Hitchcock before turning over the office to his successor, former Congressman Oscar Burleson.

The reason given for holding up these contracts is that at the time they were awarded there was no purchasing agent in the Post Office Department and the soundness of the transaction is now before the Department of Justice. It is believed, however, that the contracts as originally made will be sustained.

Philadelphia Automobile Mart Proposed

PHILADELPHIA, PA., April 19—The Philadelphia Automobile Trade Association has under consideration comprehensive plans for the establishment of a huge automobile mart—a co-operative automobile station of sufficient proportions to handle practically all makes of used cars and also built to accommodate the annual automobile shows conducted by the association.

The project as proposed and outlined by an active member of the association, E. C. Johnson, comprehends the purchase of a tract of ground and the erection thereon of a building sufficiently large to house the cars taken in trade by members of the association, who comprise a majority of the dealers and branch managers in Philadelphia. A fixed schedule of prices for these cars would be determined, each car to be under jurisdiction of the trade body.

HARTFORD, CONN., April 19—At a meeting of the incorporators of the Automobile Insurance Co., of this city, held today, it was voted that the first capital stock of the company be fixed at 3,000 shares, par value $100 per share, with stock to be offered for subscription at $200 per share, $100 to be capital and $100 surplus. The entire amount of capital stock was subscribed for and paid in cash. This new company will write automobile insurance and will begin business at once. The following officers were elected: Morgan G. Bulkeley, president; Morgan B. Brainard, vice-president; J. Scofield Rowe, secretary; Charles H. Remington, treasurer; Herbert R. Clough and J. C. Barden, assistant secretaries. Morgan G. Bulkeley, Samuel G. Dunham, John O. Enders, Morgan B. Brainard, Joel L. English, J. Scofield Rowe and Walter C. Faxon were elected directors.

Owen, Defendant, Wins $31,315

BUFFALO, N. Y., April 22—R. M. Owen & Co., sales agents for Reo automobiles, was awarded a verdict of $31,315.33 against Gustave Poppenberg, plaintiff, by a jury in the supreme court here last Saturday, Justice Wheeler presiding. Mr. Poppenberg, of the Poppenberg automobile firm sued for alleged violation of a contract to handle Reo cars made by the defendant company. The defendant had a counter-claim against the Buffalo motor car concern, also alleging violation of contract, which claim was granted. Gustave Poppenberg will make motion for a new trial of the action.

MILWAUKEE, WIS., April 21—Milwaukee oil distributors and refiners have won a victory in their fight against increased freight rates on petroleum and products from oil fields in the vicinity of Emlenton, Pa., to Milwaukee. The Interstate Commerce Commission has heard their petition and suspended the advanced rates until August 9, pending investigation. The advanced rates were claimed to form a discrimination in favor of Franklin and Oil City producers, as the rates from these points were untouched, while a boost was given the rates from Emlenton.

WASHINGTON, D. C., April 19—The Imperial Motor Co., through its president, E. A. Garlock, has filed suit against the Motz Tire & Rubber Co. and F. C. Fickling, its branch manager here, to enjoin them from attempting to establish a branch store in this city for the sale of Motz tires throughout the District of Columbia. The plaintiff claims it has the exclusive right to sell Motz tires here under a contract made in December, 1911. An injunction and accounting is asked by the plaintiff.

Connecticut Has 3,815 Building Cars

HARTFORD, CONN., April 19—According to latest reports 3,815 men are employed in the manufacture of cars and parts in the state of Connecticut with an annual value of $11,668,000. The automobile industry represents a shade more than one-half of the silk industry, one-sixth of that of foundry and machine shop products and a little more than one-half of the valuation of arms and ammunition manufactured in the state. Under the circumstances, Connecticut when compared with other states figures small as a car-producing community.

WASHINGTON, D. C., April 19—The district commisioners have under consideration a proposed regulation establishing an annual license fee of $2 for motor vehicles in place of the present perpetual fee of $2. This change in the license arrangement for Washington motorists would add $40,000 annually to the revenues of the District of Columbia, it is claimed. It would also enable the license clerk to keep an accurate list of the cars owned here, something that now is out of the question.

Increase in Trucks—Figures compiled by the Electric Motor Car Club, of Boston, Mass., show that for the first 15 weeks of the present year, the registrations of electric motor trucks show an increase in sales of 27 per cent. over the sales of the same type of vehicles registered during an equal period in 1912. The electric pleasure car registrations exceeds the total registered up to August 1, 1912.

Illinois Motor Law Invalid

New Bill Introduced Also Provides for Disposal of $600,000 Fund

SPRINGFIELD, ILL., April 22—*Special Telegram*—Measured by the pattern by which the Supreme Court knocked out the omnibus appropriation bill in the Neiberger case against the University of Illinois, the motor car license law of Illinois, under which approximately $600,000, has been collected by the state was found today to have been passed unconstitutionally and is therefore declared invalid, after an investigation in which it was found that the motor car bill was left out of the three remedial bills which went to the three special sessions under the Deneen administration. Representative Homer J. Tice, chairman of the House Goods Roads Committee, declared this morning that the motor car license fees in his judgment and according to his legal advisers had been collected under an unconstitutional act and argued it was highly important that an emergency bill be passed at once.

Mr. Tice introduced a new bill carrying all the old law and in addition providing that the $600,000 lying in the state treasury which cannot be expended without specific appropriation be paid out to the respective counties for "State Aid" roads, the latter to be specified by legislation now pending. No opposition was made until the bill had been advanced to the second reading. Then the opponents of the Tice Good Roads Bill got into action and had the emergency license act recalled and referred to the proper committee. The consensus of opinion is that there is no chance for any persons who have paid into the $600,000 fund to regain their payments unless protests were filed when payments were made.

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WILMINGTON, DEL., April 18—Following out a wish expressed by Governor Miller at the banquet which was held by the Delaware Automobile Association, several months ago, the New Castle County commissioners today took the initiative toward the construction of a continuous public road through Delaware, and it is expected that the two lower counties will follow suit.

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Alabama Tax Is Constitutional

BIRMINGHAM, ALA., April 18—By a ruling of the Supreme Court of the state of Alabama automobile tax has been declared constitutional. Justice Pelham, representing the court, handed down the decision, which holds that section 7 of the automobile regulations, which provides for the privilege tax, does not conflict with section 221 of the constitution, which forbids double taxation.

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ALBANY, N. Y., April 22—The Assembly Rules Committee reported today on the bill recommended by the secretary so amended as to provide for the licensing of all operators of motor cars without fee or examination, and authorizing the secretary to revoke or suspend licenses for cause, after a hearing, subject to a review by the courts. No license-fee change has been proposed.

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McAneny Bill Framed for Cash

NEW YORK CITY, April 21—At the last meeting of the Motor Truck Club, Deputy Consulting Engineer Gregory, of the city department of highways, explained to the members the reasons for the McAneny proposed ordinance of taxing vehicles which use the city streets, ranging from $75 to $1,000 per vehicle per year, for cars having capacities between 6,000 and 10,000 pounds. A brief review of historic taxes of this nature showed that from $5 to $30 was levied by various municipalities on trucks of various capacities.

The opposition, represented by a number of truck experts, brought up the point that the McAneny measure left speed entirely out of consideration, which, however, is fully as important in determining street depreciation as truck weight. Furthermore it was argued that if a score of municipalities in Long Island, New Jersey, Westchester county and southern Connecticut—where many trucks do regular work—would levy similar taxes on vehicles, such a course would prove a serious obstacle to truck operation in New York City.

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COLUMBUS, O., April 18—The Warnes automobile license bill was enacted into a law by both houses of the Ohio General Assembly and now goes to the Governor for signature. While there was a large amount of opposition in the house, it was not sufficient to defeat the measure, which had the support of Governor Cox, who made it an administration matter. The aggregate fees, which is expected to be in excess of $600,000 yearly, will go into the general fund and will not be used for the repair of the roads of the state.

Fees fixed by the measure are: Motorcycles, $3; electrics, $3; gasoline or steam automobiles up to 20 horse power, $5; from 20 to 30 horse power, $6; from 30 to 40 horse power, $9; from 40 to 50 horse power, $12; from 50 to 60 horse power, $15, and above 60 horse power, $15. Manufacturers and dealers are compelled to pay $10 for each license to be used only on one make of car.

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TRENTON, N. J., April 21—Beginning May 1, every applicant for a driver's license, whether chauffeur or owner, will have to undergo an examination before being granted permission to operate an automobile in the state of New Jersey. The purpose is to increase the safety of public highways, and as the legislature this year has granted a much larger number of inspectors than before, it will be possible to devote more attention to this new branch of the automobile department.

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New York's Taxi Situation To Be Cleared

NEW YORK CITY, April 23.—Mayor William J. Gaynor's committee presented to him a report yesterday in which the taxicab situation as it exists in New York at present is sized up and numerous radical improvements are suggested. These include a cut of the rate schedule to practically one-half of its present height, the abolition of private hack stands in front of hotels, a fixed penalty code for overcharges to passengers and license fees varying with the class and carrying capacities of the taxies.

The recommended rate schedule follows:

One or Two Passengers:

First half-mile or less	$0.40
Each succeeding half mile or less	.10

Three or More Passengers:

First half mile or less	.50
Each succeeding sixth mile or less	.10

The now existing schedules of two leading taxicab companies of the city are as follows, compared with the new schedule:

Schedule	Yellow	New York	Proposed New
First mile	$0.80	$0.80	$0.80
Each following fifth mile	.10	.10	.04
Standing time per hour	1.50	1.50	1.50
On time rate:			
First two hours, each	....	3.00	No hourly
First three hours, each	3.00	....	rates for
Each hour after these	2.00	2.00	taxicabs
Closed cars, time:			
Per hour, week days	4.50	....	Ordinary
Per hour, all days	....	5.00	provisions
Per hour, Sat., Sun., holidays	5.50	(Standing	apply to
Limousines, week days	5.50	time at	larger mo-
Limousines, S. S. & H.	6.50	$2 p. hr.)	tor taxis

It will be readily seen that while 1-mile trips or other short jaunts will cost almost as much as before, longer trips will show a saving to the passenger.

It is proposed to have hackstands in the streets, open to all cabs alike, whether company-owned or independent.

All cabs will have to get city licenses for $5, and owners or drivers operating cars not properly licensed are liable to a penalty of $50 fine or 30 days in prison or both. An overcharge of more than 5 per cent. may result in $50 fine for every such offence; improper lighting after sunset may incur a fine of $10 and operating a meter from a wheel, driven by power, $25.

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NEW YORK CITY, April 23—At a meeting of the Electric Vehicle Association last night in the Engineering Societies building, a paper by Daniel J. Tobin, president of the International Brotherhood of Teamsters and Chauffeurs was read in the author's absence by William H. Ashton, general organizer of the same body.

Mr. Tobin's paper was chiefly devoted to explaining that the teamsters' organization fully recognized the inevitability and commercial value of the power truck and was therefore not opposed to its introduction. With reference to the transfer of drivers from horse drawn to motor vehicles it was stated that "90 per cent. of our chauffeurs in every city and town who are members of our organization were formerly teamsters or drivers. We are thoroughly satisfied with the change, and the work in nearly every instance is becoming easier."

The meeting was addressed by Arthur Williams, president of the Electric Vehicle Association, who dealt with the problem of the education of drivers taking up the new calling. An educational committee of the association has been formed to consider the possibility of providing training facilities for these men. In the discussion on this matter which followed it was the general opinion of the meeting that the teamster who showed some aptitude at picking up a knowledge of the mechanical side of truck operation proved a more efficient man in the driver's seat than one whose knowledge was confined to the motor itself.

Detecting Resistance—Saving Fuel

PART II.

Construction of the Accelerometer and Some of the Results Actually Secured from Its Use Are Explained in This Article—Comparison of Three Touring Cars on Road Shows Wide Differences of Resistance

By W. C. Marshall

THE first of Professor Marshall's articles on the accelerometer appeared in THE AUTOMOBILE for April 17. In that issue the use of the accelerometer and its value to the automobilist were discussed. This week the construction of the instrument is explained and some of the results of tests made upon actual cars are given.

The accelerometer is an instrument used to measure the acceleration and retardation of the car. Its readings are given in pounds per ton for the retarding force and in feet per second per second for the acceleration. The gradient in per cent. of the road is also indicated by the instrument. The dial is arranged so that the single needle indicates grade and acceleration. A clear conception of the appearance and method of operation of the instrument may be gathered from a reading of Part I of this series.

The general internal construction and principle of the accelerometer are illustrated in Fig. 1.

A copper frame A moves in a plane perpendicular to a vertical spindle B. The spindle forms the axis of rotation of this mass of copper and supports it. The center of gravity of the mass of the copper frame is to the left of the axis. The spindle B carries a gear wheel C, meshing with a second gear of the same size fastened to another vertical spindle D, which is attached to a hair spring E.

Any acceleration in the direction of motion tends to make the mass of copper lag, due to the posiiton of its center of gravity to the left of the spindle B.

This lag rotates the spindle B, which, through the co-relation of the gears, rotates also the spindle D and winds up the hair spring E. It is evident that the greater the lag of the mass of copper the greater will be the amount that the spring is wound up, and hence the acceleration is measured by the degree to which the spring is wound up.

The needle is not affected by any changes of grade because the downward acceleration is neutralized. This can be explained mathematically.*

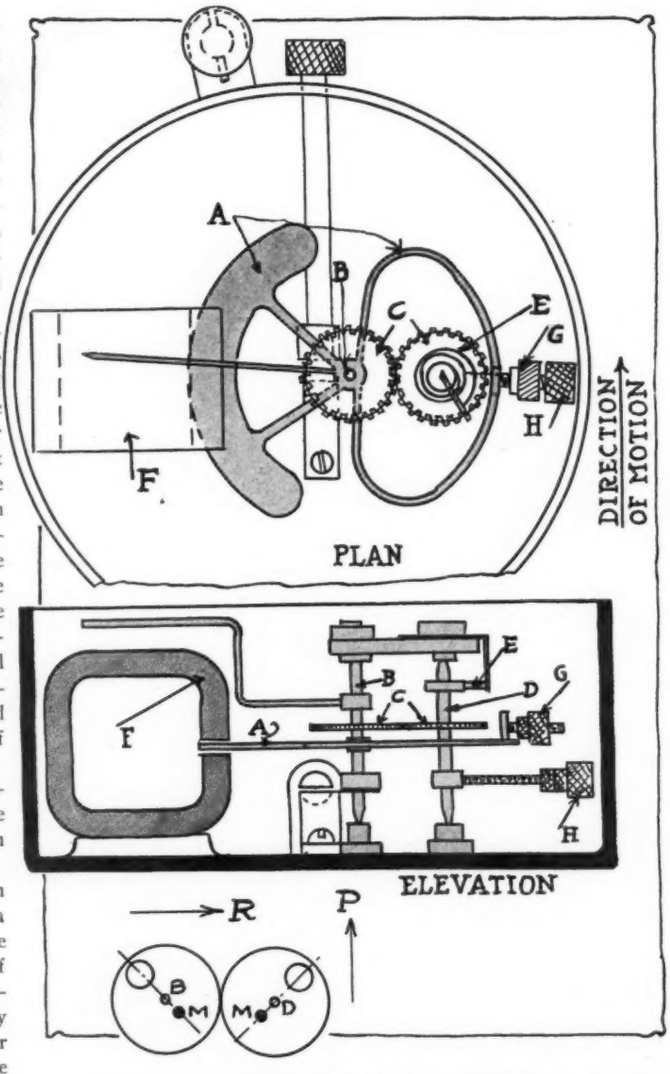


Fig. 1—Sectional elevation of the Wimperis accelerometer showing its construction. Below is given a plan of the instrument and a diagram showing the action of the counter-balance eliminating the effect of changes of level or curves upon the readings. The readings are given by the lag of the weight A, in rotating about the vertical axis B, when the car is speeded up or retarded. The action of the weight, which consists of a copper framework, is controlled by a hair spring similar to that in a watch. It is indicated in the illustration by E, and is shown in plan and elevation. The magnet F prevents the movement of the frame A in a vertical direction and gives the metal steadiness in a horizontal plane.

*Let the slope be α and the weight of the moving parts of the accelerometer be w.

Let the distance traveled be x and let g be the acceleration due to gravity.

Then the acceleration of the car is $\frac{d^2x}{dt^2}$ and the forces acting to produce acceleration of the car in the direction of motion are + (w sin α + F), supposing the slope downward, but F = mass times acceleration, or $w \sin \alpha + F = \frac{w}{g}\frac{d^2x}{dt^2}$ — g sin α $\therefore$ $\frac{d^2x}{dt^2} = \frac{g}{w}$ (w sin α + F).

On account of the slope the needle will not rest at zero, but at a reading denoting the slope as — g sin α.

The needle has to move through this amount before it shows any reading beyond zero on the opposite side.

The actual acceleration will therefore be $\frac{g}{w}$ (w sin α + F) — g sin α, or an acceleration of $\frac{Fg}{w}$ feet per second per second.

To find F multiply this reading by $\frac{w}{g}$.

If we wish to read F in pounds per ton multiply the acceleration by $\frac{2000}{32} = 62.5$. This multiplication is avoided by graduating the dial directly in pounds per ton of 2000 pounds.

A permanent magnet F, whose vertical field tends to check any oscillation of the copper frame A in a horizontal plane, may be seen in both the elevation and plan view given in Fig. 1. In order to make the instrument measure correctly when traveling around curves or on a heavily crowned road two compensating balances G and H are fitted in the manner shown in the accompanying illustration.

The forces acting at the center of mass of the copper frame of disk are directly proportional to the impressed acceleration, but, as the disk rotates through angles of 30 degrees, 40 degrees, etc., the lever arm of the force grows less. This decrease of moment produces less twisting effect on the hair spring, causing the angle of rotation to decrease in proportion to the increase in acceleration. The scale has to be graduated in accordance with this fact, which gives closer divisions at the end than at the center of the scale.

A study of the compensating balances shows their method of actuation to be as follows: While the disk is deflected by a certain amount of acceleration, say in the forward direction of the car, and a second acceleration, such as would be caused by a slope in the road, acts at right angles to the first, it would tend to add or substract from the force, causing the hair spring E to wind up, which, of course, would give a false reading on the needle.

The gear wheels are so arranged by their connection to the balance weights G and H that they are, in effect, disks. The moments of the mass of these disks about the axes B and D are equal. The centers of mass of the disks, if at M equally distanced from B and D, will produce revolution of the disks about the centers B and D when a force acts upon them in the direction of the arrow P. A force, however, acting in the direction of the arrow R will produce no effect on them. Forces perpendicular to the plane of the page will have no tendency to cause or produce rotation. Therefore the only acceleration recorded will be that which is produced by a force acting in the direction indicated by the arrow P or opposite.

In taking the acceleration readings no effect is produced by a down grade. This is so, because the gravitation effect on the needle on account of the slope is neutralized by the acceleration due to gravity acting upon the car when the latter descends a slope.

In Fig. 2 a series of curves made from accelerometer readings on a five-passenger touring car with a torpedo body are shown. The car held two persons and weighed, during the tests, 3,925 pounds. The road surface was of macadam and was in good condition, being hard and level.

Curve 1 was obtained from the readings taken on the accelerometer at speeds varying from 10 to 40 miles an hour. In each case the clutch was thrown out and the retardation noted at each speed on the instrument.

After taking these readings the horsepower was calculated and plotted by taking ordinates as horsepowers, with the abscissæ representing speed in miles per hour. The spots on the curve were first laid down as per the calculations and a fair curve, representing an approximate result of all the calculations, was run through. This horsepower is the actual horsepower developed by the motor and required by the car when actually upon the road.

Horsepower Obtained from Accelerometer Readings

In this set of curves given in Fig. 2 the curve marked 2 was obtained by bringing the car up to various speeds and then cutting off the ignition. The horsepower was then calculated from the readings given on the accelerometer. The curve was plotted through average spots and indicates the trend of the resistance.

The vertical distance between curves 1 and 2 represents the difference between these curves and hence indicates the frictional horsepower loss in the motor and clutch.

This is approximately 1.5 horsepower at 15 miles per hour and 4 horsepower at 30 miles, showing an increase in friction with increase in speed. This agrees with the laboratory experiments on motor friction in internal combustion engines.

The revolutions per minute of the motor are given on the line above the miles per hour. The wheels in this case were 36 inches in diameter and the gear ratio on direct speed was 3.5 to 1.

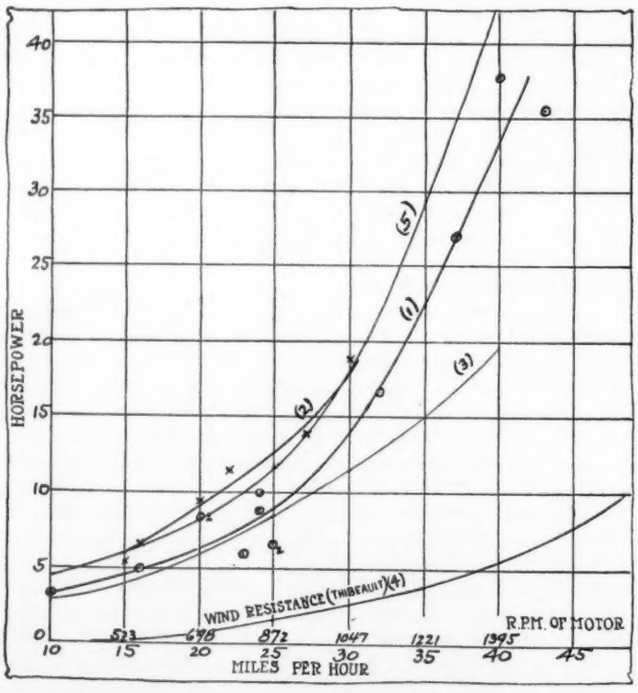


Fig. 2—Curves from accelerometer readings taken on touring car

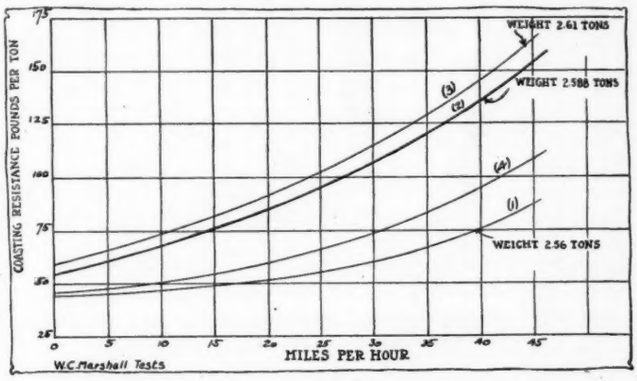


Fig. 3—Coasting resistance curves of cars at various speeds

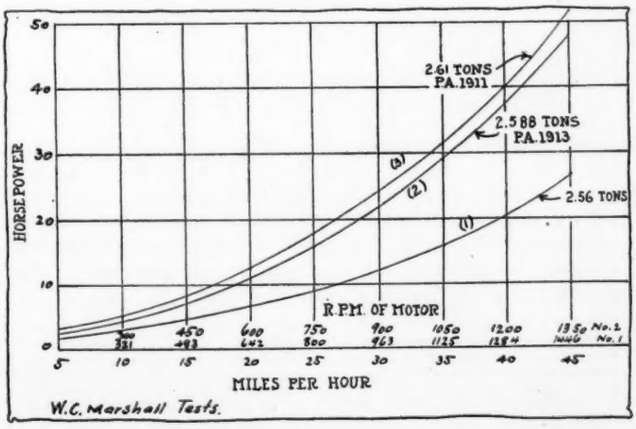
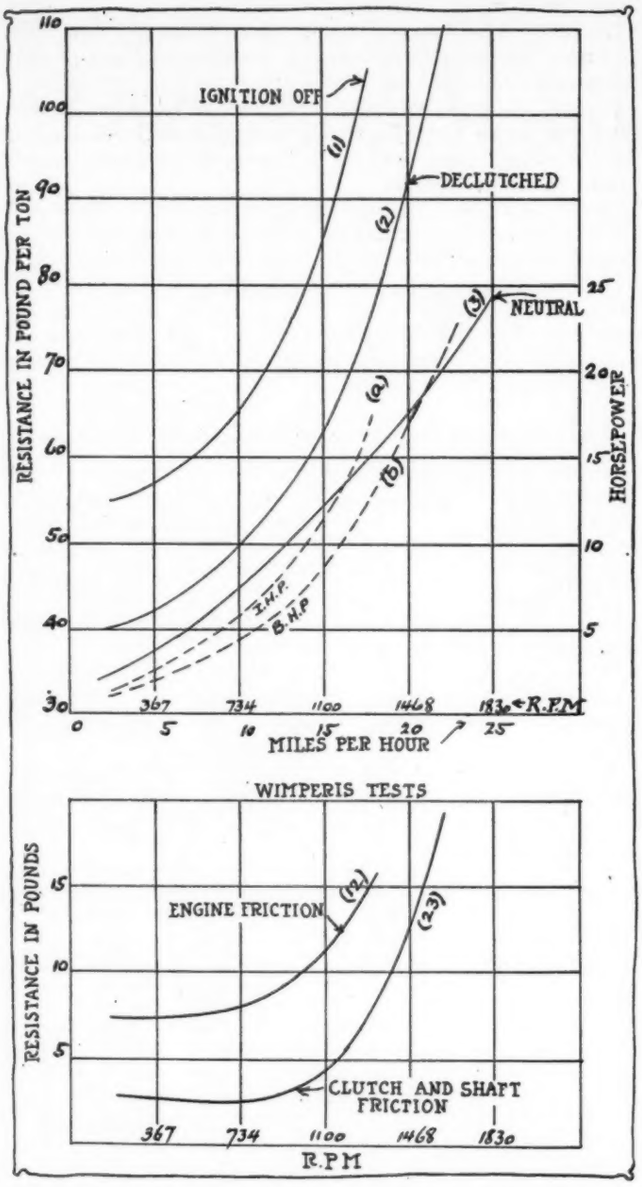


Fig. 4—Horsepower curves of three six-cylinder cars tested



Figs. 5 and 6—Coasting resistance curves of 3-ton wagon at various speeds. Engine and clutch friction curves

Curve 3 is the theoretical curve of resistance of the car plotted from the formula $R = 47 + 12\left(\frac{V}{20}\right)^2$ and the equation $HP = \frac{R \times 1.96 \times V}{375}$ **

This equation has been derived from experiments which show that the resistance per ton to rolling is 47 pounds and that the resistance due to wind resistance would be $\left(\frac{12\,V^2}{20}\right)$. The horsepower formula is deduced from the fact that 33,000 foot pounds per minute make 1 horsepower and therefore the pounds per minute exerted by the motor in overcoming the car resistance divided by 33,000 give the equation for the horsepower. This simplifies itself to the expression given above.

**Thibeault's experiments on wind resistance resulted in this formula: $R = \theta\ EAV^2$ where θ is a constant .0625; E is the length of the car in proportion to its front area; i.e., 1.1A is the area in surface of car presented to the wind in square meters. R is the resistance in kilograms. V is speed of the car in meters per second. Reducing this to English measure gives $R = .014A\left(\frac{V}{28}\right)$. A is in square feet and V is velocity in feet per second.

The resistance of the wind is shown by the curve marked 4 on Fig. 2. The rolling resistance is the difference in vertical height between the curves taken with the clutch thrown out from readings on the accelerometer, or, in other words, curve 1 and the curve of wind resistance 4. On this car it will be noted that below 25 miles per hour the resistance is low.

To obtain the horsepower curve which shall show the true horsepower at the clutch it will be necessary to divide the ordinate by the percentage which the coasting resistance bears to the power resistance at the clutch. That is, to be specific, 70 per cent. at 30 miles per hour. Curve 5, Fig. 2 shows the horsepower at the clutch.

Comparative tests to demonstrate the easy or stiff running qualities of a car are given in Fig. 3 by curves 1, 2 and 3. Curve 1 shows an easy running car as compared to that in which the resistance is higher. See curves 2 and 3.

Curves 1, 2 and 3 are coasting resistances of three six-cylinder cars weighing respectively 5120, 5176 and 5225 pounds. Curve 4 is the theoretical resistance curve. The low resistance shown by curve 1 is remarkable and far above the average, denoting excellent condition regarding frictional and air resistance. These curves were made over the same stretch of road having good hard macadam, curves 1 and 2 being plotted from tests made the same day.

The high resistance of car 3 was found to be due to dragging brakes which produced excessive friction. The car would have undoubtedly been run without any knowledge of this trouble had it not been tested by the accelerometer.

Horsepower Required for Driving

The difference in horsepower required to drive these three cars can be easily seen by referring to Fig. 4. At 20 miles an hour car number 2 requires 72 per cent. more horsepower than car number 1. At 30 miles 83 per cent. more and at 45 miles 81 per cent more. Reduced to actual horsepower this amounts to 4.5 at 20 miles an hour, 10 at 30 miles an hour and 21 at 45 miles an hour. This is enough to produce a large increase in car mileage costs of gasoline, oil and tires. The gear ratios on direct were 3.43 to 1 on car 1 and 3.3 to 1 on car 2.

The tires were 37 by 5 inches on the rear wheels of both cars and on the front wheels of car number 2. Car number 1 had 36 by 4.5 inch tires on the front wheels.

The motor dimensions of both cars were the same as regards stroke, but in diameter car number 1 had a bore .25 inch smaller than car number 2. The revolutions per minute at the various car speeds for 1 and 2 is placed above the speed in miles per hour on the chart given in Fig. 4.

In Fig. 5 the coasting resistance of a 3-ton wagon are plotted with reference to various speeds, under running condition, marked on each curve. The horsepower curve a is calculated from the resistance with the ignition cut-off. Curve b representing the resistance at the clutch can be called the brake horsepower. The sharp rise of the curves in Fig. 6 show the increased power required at high speeds.

The remarkable variations in coasting resistances shows that this part of the design, while carefully worked out theoretically, has never been subjected to actual test. The accelerometer offers a method of comparison between different cars and also for the same car at different speeds. In a series of tests recently made the coasting resistance of twelve different pleasure cars, all having pneumatic tires and windshields, and two trucks with solid rubber block tires, was measured. The tests were made on smooth wood block pavement in New York City at speeds of from 10 to 25 miles an hour. The results were as follows:

Speed, miles per hour	Maximum resistance	Minimum resistance	Average
10	50	40	45
15	60	45	50
20	70	56	60
25	100	65	80

This shows a difference of 35 per cent. between the highest and the lowest at the common speed of 25 miles an hour.

(To be Continued.)

The Engineering Digest

A Digest of Technical Information from the Engineering Journals

¶ *Either to criticize or to admire, motion-views form of automobile manufacture loom up as a new necessity—a spur to better methods or an advertisement of a success achieved—How to get them.*

¶ *Some of Dr. Riedler's cameo-cut ideas dressed for the instruction of the populance—Not without flaws.*

¶ *A rifle-lock mechanism, quickly operated, for a demountable wire wheel.*

¶ *Lubricating news—important if true—returned from abroad—Muslin gears—what they claim for them.*

MOTION Pictures from the Shops.—Kinematograph views now play a notable part in manufacturing operations, being useful for two very different purposes. One is to assist in the study of the motions of both men and machines, and the other is to furnish captivating and up-to-date advertising material, the latter mainly for use in connection with lectures and conventions and of course mostly of value for industries, like the automobile industry, whose output and methods of production are in the public eye. With regard to the use of the pictures for motion study and the improvements of methods and machinery which should be the result of such study, it is becoming recognized that observation of the views is more fruitful of results than direct observation of the work, even if it may need to be supplemented and verified by the direct observation in some cases, partly because the successive views, which may be unrolled before the screen or the eye with any desired slowness, naturally dissect the movements, and partly because they may be filed and indexed and taken out at any convenient time when the subject which they illustrate is under debate.

G. A. Fritze writes on this subject with special reference to the details of the electric lamp installation which must be provided in a factory, if the management prefers to operate its own kinematograph outfit or wishes to be in a position to call in an operator for quick special work at any time and with short notice. The more usual situation is that the kinematograph firm provides the necessary portable artificial light equipment for the interior views and that the manufacturer plans to have all the processes which he wishes to investigate or advertise covered in motion pictures consecutively during one short period. In some places, however, such as rolling-mills where the camera cannot be placed very close to the subject, on account of the progression of sputtering red or white-hot strings of metal which interpolates the space, or as drop-forge plants, where the intermittent concussions call for special suspension methods to protect cameras against shocks, the burden of providing a suitable installation for kinematograph work will largely fall upon the works-management.

In the choice of subjects for the motion-camera there is room for judgment and experience. Not all processes or machines are rendered well in films. Wheels with spokes, such as flywheels, or machines whose operative movements are merely rotary, show too little motion or even may seem to run backward if the wheel movement happens to coincide in speed with that of the films. The observation of a large number of machines in whose operation the attendant plays only an inconspicuous part is usually tiresome to a lay spectator. Machines of this kind should be singled out for separate views, showing the movements of the parts of one machine only and on a large scale, which means a nearby-view with carefully directed illumination. Strongly reflective surfaces are likely to spoil the whole effect of a film, and it is often necessary to paint them over in lime colors or cover them with dark paper in some inconspicuous manner. Large black parts, on the other hand, leave an inpenetrable blotch of nothingness in a picture and are better painted gray. A color atomizer serves these purposes. Step ladders should be on hand to facilitate high views.

It is a considerable advantage of kinematographic work, as compared with ordinary photography, that it need not interfere with the daily manufacturing routine, if the preparations are made in advance, the night before or during the noon hour. Workmen are not temporarily turned away from their machines and tools; on the contrary, they must continue at their tasks if good films shall be produced. In practice the work must, however, be laid out with some reference to the pictures, in order to get everything into them that is wanted. Articles like oily cotton waste in odd places, lunch cans and bottles may be lifelike, according to the customs of a factory, but they rarely look well in pictures. Like the actions in a drama, these should be confined to essentials. The appearance of any person who seems to be idle in motion-views of a shop, even if he is a foreman or an inspector, is a mistake.—From *Werkstattstechnik*, April.

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DR. RIEDLER'S Science Popularized by Riedler.—The complete popular review of automobilism given by Professor Dr. Riedler in the latest German technical encyclopedia continues to attract attention, because it is understood that the facts and views presented in it agree completely with the large stock of technical data which have been sifted out through several years of scientific testing of cars and their parts, on the road and in the laboratory of the author at the Technical Highschool at Charlottenburg, and because it brings these data into relations with questions of wide general interest. Some extracts from this review, in addition to those presented last week, speak for themselves in showing to what extent the conclusions of the foremost German specialist on the subject agrees with the American development, in which respect it may be noted, however, that Riedler cannot be fully acquainted with the very latest improvements in such things as motor-starters and is inclined to push to one side as too cumbersome (*umständlich*) any device which seems to him too costly and elaborate for the importance of the special purpose it serves, particularly if that purpose is not yet fully and infallibly served by any of the devices in the market. He thus takes cautious distance, for the present, from wire wheels, new valve systems, silent chains and motor-starters while refraining from judgment on other points such as the relative values to the public of small motors with high piston pressures and larger motors with lower pressures and greater flexibility (meaning by the latter term a wider power range under the throttle without recourse to gear-change). The extracts follow:

Noiselessness.—The silent running of a car depends upon the machinery as a whole, upon the distribution of forces and masses in the vehicle, upon the oscillations and vibrations of machine and vehicle parts, upon the balancing of motor forces

and finally, in relatively small degree, upon the valve movements. Details of a motor, such as the magneto-drive, the pump-drive, etc., may cause more noise than the motor proper. Silence can be secured with poppet valves, if they are raised gradually with short lift and are closed gradually, which is only a matter of correct design [including larger valve dimensions, other things equal—Ed.]. The main cause of noisy running at high motor speed lies in the vibrations of machine parts. Every part has its own radius and period of vibrations and a critical vibration at which the noise becomes maximum. When the critical vibrations of several parts coincide, the noise can become intolerable. The principal means for securing noiseless running is therefore: To avoid or to break up and muffle the vibrations of individual parts. Subsidiary means for the same purpose consist in: The use of slide valves (sleeve or rotary) instead of poppet valves, the encasing of valve action, etc. The main causes of the noise are entirely independent of the system of valve control. It is one of the results of the introduction of sleeve valves that now noiseless running is demanded of all automobiles, and this demand can be met with any correctly designed and built poppet-valve motor. But there are many experienced drivers who do not wish complete silence, so far as the motor is concerned, and on the contrary much prefer that the motor shall have something to tell them of its inner workings during the running.

Motor-starters.—Cranking of large motors may become a very laborious task in cold weather. Injection of gasoline into the cylinders or other expedients must then be employed. Hence the many efforts at perfecting motor-starting devices. All of them, including those operated with compressed air, have however so far proved too cumbersome. In many cases, for that matter, the difficulties in cranking are not to be ascribed to the motor but to the carbureter; to the faulty gas mixture produced in it at low-speed suction, particularly to over-saturation of the mixture.

Brakes.—Front-wheel brakes are dangerous because they suddenly change the resistance to rotation of the steering wheels [Dr. Riedler here takes distance from certain theories to the contrary, which are advocated in France and practiced to a very limited extent in British cars—the Argyll, for example—and not unsuccessfully, it seems—Ed.]. . . . By driving in the mountains, extensive use of the rear-wheel brakes may result in overheating and even in the failure of the brake action, but the driver can always avoid this effect by timely use of other means for retarding the car. The motor especially can serve this purpose. By closing the throttle and letting the motor be dragged idly by the car, a certain brake effect is produced, and this can be increased by throwing the high gear into mesh, so as to force the idle motor to run faster [the reader will readily correct the slip in Riedler's statement on this point—Ed.], thereby easily reaching a degree of resistance by which the brakes may be dispensed except for an occasional equalization of the forces where the gradient of the slope changes. No water-cooling of brakes is then required. No objection to the use of the motor as a brake in this manner can be raised on account of any alleged tendency to overheating, as the cooling water in the motor disposes of the heat generated by the brake effect. Arrangements are also in the market by which the carbureter is so transformed as to make the motor act as a compressor-brake.

If in many cars the motor is not utilized as a brake, it is because the automatic lubrication continues unabated and fouling of the spark plugs easily ensues. But this can be avoided by a correct lubrication system. Failure, excessive wear and overheating of brakes are always the result of unsuitable construction or unskilful handling. Sprags are always an unsafe means for arresting a moving car, and should be used only to permit the previous release of brakes at the starting of a car uphill—like a stone chocked under a rear wheel.

Speed.—Fast driving is a mere matter of sport and brings no average gain in transportation results. With a small car, an average of 40 kilometers per hour can be attained; with a powerful car perhaps 50 kilometers. To reach a materially higher average it is necessary to drive at times as fast as 80 kilometers, and road stretches fit for this speed are not commonly available. Even speeds of 60 kilometers usually result in a waste of time, as the delays incidental to tire troubles caused by such speed should be taken into the count.—From *Automobil-Rundschau*, March 30.

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HELIOS Demountable Wire Wheel.—The many new wire wheels now offered in the French market are said to differ mainly in the means employed for locking the demountable hub, to which the wire spokes and the rim are secured, to the inner hub, which is mounted by ball-bearings upon the axle-end and remains there when a wheel is replaced. A description of the Helios wheel, which is of this type, is limited to the locking mechanism used in it, and it is mentioned as a notable advantage that the parts of this mechanism belong to the fixed and not to the demountable portion of the wheel, by which provision the spare wheel becomes simpler and cheaper. The time required for mounting or demounting is represented as 30 seconds. The construction, as shown in the sketches (drawn from half-tones) in Fig. 1, seems to apply to front wheels only; at least no means for keying a wheel-shaft to the interior of the fixed hub or to the locking-device are explained or indicated.

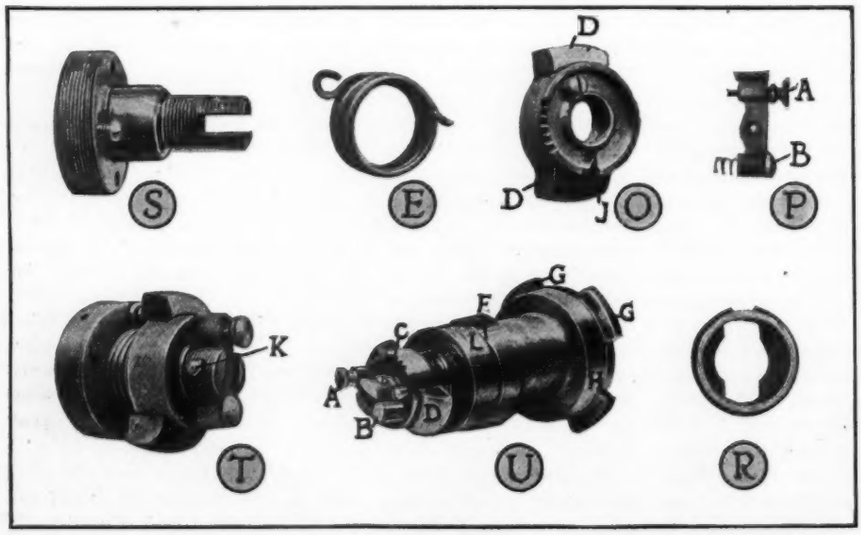

Fig. 1—Parts of fixed hub and locking-mechanism of Helios demountable wire wheel

Among the sub-figures, U represents the fixed hub with the locking-parts secured upon it in the position they occupy when a wheel is to be placed upon it or removed from it; T represents the pieces S, E, O and P put together, and R represents the design of the outer end of the demountable hub, the keyplate having an opening admitting of passing the locking-parts through it in one position while locking against them by a quarter turn.

The fixed hub has four lugs G interlocking with four corresponding lugs on the inward flange of the demountable hub. This constitutes the rotation-lock. Otherwise the demountable hub is seated upon the two conical zones H and F of the fixed hub. Outside of F there is a short cylindrical extension of smaller diameter upon which the part S is threaded, and upon the latter there is in turn threaded the ring L which serves as a locknut. The coil spring E is passed over the slotted shank of S and

mounted loosely upon the cylindrical boss of the same piece, one end being looped and secured under a screw-head. The lock-piece O is screwed upon the slotted shank and when nearly home engages the bent-out free end of spring E by means of a hole in its inward face. If the lock-piece O is now turned to the left, the movement must be made against the strong torsional resistance of the spring E. The piece P may be looked upon as a key to the locking-device. It rides in the slot of the threaded shank of S, and a spindle K permits it an oscillating movement therein. At one end it has a small coil-spring attached to a screw-button B, at the other a setscrew with a knurled head A and, beyond this, a projecting beak adapted to engage one of the notches C in the raised edge of O or else the deeper notch J in the same circumference. The spring at B serves to tecter the key around spindle K so as to engage the beak in one of the notches. The setscrew A, on the other hand, serves to release this engagement.

When the key-piece has been placed in its position, with the setscrew tight, the lock-piece O is turned with a spanner against the resistance of spring E until the beak of P is opposite notch J. Then A is released and the beak falls into the notch, holding the lock-piece in the position given it. The keyplate R in the demountable hub is now passed over the locking-mechanism, so that the jaws D come on the outside of the plate, registering with the aperture in it. When now the setscrew A is applied, the beak is released from notch J, and spring E snaps the lock-piece around about a one-quarter turn, locking the jaws D against the segments of the keyplate and forcing the demountable hub firmly against its seat. By releasing the setscrew A again, the beak of the key drops into one of the small notches C. Demounting takes place by reversing this order of operative movements.

The customary screw-cap upon the outside of the demountable hub adds the usual protection.—From *La Vie Automobile*, March 22.

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HOME News—about Lubricants—from Abroad—Owing to a peculiar mix-up of scientific data and commercial conditions, news relating to the experiences which makers and owners of automobiles are gathering with reference to lubricants must frequently be obtained from European sources, although the lubricants themselves are generally of American origin and manufacture. Thus *Omnia* has lately received a number of communications relating to the practice of mixing 3 to 7 per cent. of lubricating oil with the gasoline supply while at the same time reducing the splash feed to the cylinders and piston pins to a minimum, the object being four-fold; namely, (1) to have the quantity of oil deposited on the cylinder walls proportionate to the force and heat development of each explosion, (2) to make sure of having fresh oil for each explosion, (3) to economize and (4) to avoid smoky and nauseous exhaust. The practice is admitted to be of American origin and is said to be especially in vogue for small two-cycle boat motors in which the explosive charge is transferred from the crankcasing to the combustion chamber. Nearly all of the reports by French experimenters to the journal mentioned above are decidedly favorable. Only one of them complains that a marked gain in the sweetness of the running of his motor was followed by a stubborn clogging of the carbureter nozzles, and this is tentatively ascribed to the presence of resin oil in the lubricant employed.

With regard to the use of deflocculated graphite in the lubricant, notes of commendation and even of enthusiasm are frequently seen in the European automobile and engineering journals and in scientific periodicals of wider scope. Colonel Kurt Bilau devotes to the subject a lengthy article in *Automobil-Rundschau* of March 30, based in part on tests made by the Automobile Club of America and by the Automobile Club of France, the results of which were published in THE AUTOMOBILE at the time when they were made. But Col. Bilau adds information derived from other sources and which may be considered as important if true. He says:

"The poorest oil is good enough for carrying deflocculated graphite to the point of lubrication. Kerosene, for example, will do, although it has scarcely any lubricating value. Nay, where it is practicable to use an ungreased bearing, even water can be employed. A little preparation of the graphite with tannin enhances the stability of its emulsion in oil. There is only this to be observed, that the oil or water which acts as a vehicle for the graphite must be free from acid, as otherwise the graphite does not remain entirely in suspension. But the requirement consisting in freedom from acidity is met in even the poorest automobile lubricating-oil, so that the automobilist, by adding this grade of graphite, may reduce the quality of his lubricating-oil without worrying. He may freely employ any oil which he can buy at the roadside; and this is an advantage not to be underrated. It will surely take the graphite to all the bearings."

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SPURWHEELS of Muslin.—A great many sheets of muslin—the number depending on the width of gear teeth that is wanted—are piled in a stack and soaked in machine oil, whereafter round blanks are stamped out of them. Each of these is placed between steel disks of equal diameter and powerfully compressed to the required thickness, then riveted or bolted. The gear teeth are then milled in the usual manner. The method is American, and the gear wheels so produced are 20 per cent. stronger than rawhide gears, according to data furnished *Werkstattstechnik* (April issue) by Otto C. Reymann of Pittsburgh, Pa. The durability of the muslin gears is said to be extraordinary and due to (1) the elasticity of the teeth (the confining steel plates taking no direct part in the work), (2) their indifference to mineral oil which is injurious to rawhide, (3) a certain self-oiling property derived from the oil used in their production and (4) their indifference to such overheating as may be caused by overloading and neglected lubrication. On the last point, it is claimed, the superiority over rawhide is marked, with the result that the dimensions of a muslin gear—and therefore also those of its metallic mate—may be figured without the large allowance for possible overheating which is necessary with other silent gears. Similar gears made from textile material are made in Germany by F. Stolzenberg & Co., of Berlin-Reinickendorf, adds the editor of *Werkstattstechnik*.

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ONE More Elastic Wheel—The industrious inventor has again evolved and materialized a new idea in elastic wheels. In this case the wheel contains no element which in itself would be recognized as elastic, but a certain and not inconsiderable degree of elasticity is obtained, anyway, by having very many elements, each almost rigid, and coupling them together in such manner that a pull on one of them is transmitted at once to all of the others. Thus, if each of 100 elements is made to yield under a shock 1/10 of one millimeter the total cushioning effect which may be produced in one spot may approximate 10 millimeters or 2/5 of one inch. In addition, the rim has a slight yield of its own. Imagine forty round steel links secured pairwise by twenty clips to the inner circumference of a loose rim with a tire band, each clip holding two links, and imagine further that the pairs of rings so suspended are joined by twenty other clips which are pivotally secured to a wheel rim considerably smaller than the loose rim with the tire band. The rings supplemented by the two opposite sets of clips, one fixed and the other capable of pivoting in the plane of the wheel, now form a complete chain anchored inwardly to the wheel rim and outwardly to the rim with the tire. At one point of the wheel rim the pivoted clip is replaced by a very substantial fixed one, so that the mere traction resistance shall not make all the pivoted clips lie down. The contacts of each clip with its pair of rings are designed to afford a rolling action and 160 places where wear may be taken up by eccentric adjustment.—Illustrated and described in *Omnia*, April 5.

Horsepower As Basis For Tax Discussed

Part IV

Prominent Engineers Agree in Opinion That Taxation of Cars Should Not Be Based on Horsepower of the Motors

Watts Favors Basis of Weight and Power
Schimpff Points to Power and Speed Variation
Schnitker Considers Conditions on the Road
Metz Finds S. A. E. Rating Manifestly Unfair
Brockway Wants Taxation on Horsepower Used
Nutt Says Engineers Should Get Together
Kelsey Doubts Power of Long-Stroke Motor
Wadsworth Proposes Combustion Chamber Basis

THERE is a widespread interest among the automobile engineers today in the problem of horsepower rating in general and in the question of basing of taxation on automobiles on the rated horsepower of the motor. The article entitled "Cars Taxed on Unused Horsepower" which appeared in THE AUTOMOBILE for March 27 called forth a great many letters on this subject, so many, in fact, that the discussion will be continued in THE AUTOMOBILE for May 1.

S. A. E. Horsepower Rating Is a Joke—Watts

DETROIT, MICH.—Editor THE AUTOMOBILE:—It would seem as though both horsepower and car weight should be considered for taxation purposes, as probably both of these have their effect upon the rate of wear of the road. If, on the other hand, taxation is to be based upon money invested, it should certainly vary with the year in which the car was produced.

From an engineering standpoint the S. A. E. horsepower rating has been a joke for some years past. There is only one logical method of rating horsepower for general purposes and that is a classification based solely on piston displacement.—F. E. WATTS, Hupp Motor Car Co.

Little of Available Power Used—Schimpff

CINCINNATI, O.—Editor THE AUTOMOBILE:—Taking motor block test, Sprague dynamometer, as a basis and assuming the different rates of speeds that people will drive, we arrive at the following:

Our car has a motor rated at 45-50 horsepower, and at 1,625 revolutions per minute actually develops 45 horsepower. But show me the average owner that drives his car with a motor turning over at this speed. Consequently, assuming he drives at different speeds, we can give the highest horsepower in proportion possible by taking it off of our shop chart. For instance, at 20 miles an hour with our car his motor could be turning over 660 revolutions per minute, which would show a motor equivalent at that speed to only 20 horsepower. At 25 miles per hour it would be equivalent to a motor of only 26 horsepower, and even at a speed of 35 miles per hour, very seldom traveled at by the average driver, it would only be equivalent to a motor of about 36 horsepower.

Of course, it is a boon to the automobile dealer to be able to rate his motor at a high horsepower. It is a pride of the car owner that he have a high powered motor and very few people ever stop to reason or think that the horsepower lowers or increases according to the speed, thereby using more or less gasoline, being more or less wear to the road, and being more or less liable to accident with the traveling public.

The above figures we consider are very high, as the average owner never drives over 15 to 18 miles per hour, so that the horsepower would certainly be much less than any of the above.

If necessary we can give actual figures and duplicate bench tests showing horsepower curve at different speeds.—H. SCHIMPFF, Schacht Motor Car Co.

Bench Test Not a Fair Driving Test—Schnitker

CHRISMAN, ILL.—Editor THE AUTOMOBILE:—Every builder of motors knows that a bench test is not a fair driving test and that the horsepower developed in the actual work of pulling a car on the road is far below the bench test, being very similar to theory and actual practice.

Everything is favorable to a test of horsepower in the factory, because you have no road conditions to contend with, so that we know and feel that there is no comparison with that kind of a test and the actual test of developing the horsepower on the road.—A. E. SCHNITKER, Rayfield Motor Co.

Consistency Is Imperative—Metz

WALTHAM, MASS.—Editor THE AUTOMOBILE:—It is manifestly unfair to rate a motor such as ours, which is a four-cylinder, 3.75 bore and 4-inch stroke, at 22 horsepower, and a four-cylinder, 3.5 bore and 5-inch stroke under 20 horsepower.

There is no sense in the manufacturer claiming to the public that he has a 30-horsepower motor, then going to the highway commissioners and arguing that he has only 19 horsepower for the sake of a lower cost in his license. In order to get fair treatment we must be consistent in our claims. If the total revenue is considered too high then let us work for a reduction on a fair and sensible basis.

You will never accomplish anything by trying to pull the wool over the eyes of an intelligent commission. You can only accomplish results by placing the matter before them in its true light.—CHAS. H. METZ, Metz Co.

Motor Could Not Continue at Rated Power—Brockway

MUNCIE, IND.—Editor THE AUTOMOBILE:—I wish to say on the subject of automobile motor horsepower, that I believe the S. A. E. rating to be very fair and I do not consider that the maximum horsepower which can be produced from a motor should be its rating. We do not rate a horse by what he is able to exert but by the amount of work which he is capable of doing consistently and stand up under the load.

I do not think that a long-stroke type should be rated as giving greater horsepower than the ordinary stroke motor, since in

order to gain this extra horsepower the piston speed has to be increased. A long-stroke motor that is developing horsepower greater than is usually obtained in the ordinary stroke motor could be compared with a trotting horse and the ordinary stroke motor could be compared with a trotting horse and the ordinary stroke motor to a horse walking. One will last longer than the other if this demand is made on the motor by increasing the piston speed.

A motor in a car on the road very seldom develops anywhere near the S. A. E. rating but the ordinary speed the horsepower develops is only a small per cent. of what the motor is capable of doing. We all know that a motor could not live long working at its rated horsepower.

I believe that an automobile should be taxed according to the amount of power it takes to run it in ordinary use rather than taxing it for power it may have in reserve, that is, if horsepower is to be considered at all by the secretaries of state.—C. P. Brockway, Inter-State Automobile Co.

Stroke Should Be Considered—Nutt

Kokomo, Ind.—Editor The Automobile:—I do not think that the S. A. E. rating is proper on account of the stroke not being taken into consideration. I think all engineers should get together and work out a formula that would take into consideration not only the stroke, bore and revolutions per minute, but also mean effective pressure. I realize that to work out a formula that would be fair to all would be quite a task. Perhaps it could be done in this way: Take five or ten motors of each size and get the dynamometer pull at different speeds, and strike an average. This would involve a great deal of labor, but would enable us to work out a formula that would be an average or comparative formula for all motors. Of course, this would make it unfair for the companies having a very efficient motor on account of proper valve sizes, proper compression ratio, etc., so after all is said and done a formula made up, taking into consideration valve size, ratios and other details which have an important bearing on power would perhaps be the best and only way to work it out.

On the other hand, we are up against the laws of the country regarding license fees for operating automobiles. Here is also an opening for somebody to get busy and determine the average horsepower that is used for legitimate road driving, especially when you realize that when a car is driven over the road at a speed of 20 miles an hour, it only requires from 5 to 8 horsepower to do the work, so you can see that the horsepower rating is a problem not easily adjusted.—F. N. Nutt, Haynes Automobile Co.

Should Rate Motors Under Normal Conditions—Kelsey

Hartford, Conn.—Editor The Automobile:—The horsepower of the various automobiles as advertised, ourselves included, I think is deceiving. In our own case we list our car at 10 horsepower, the A. L. A. M. rating being 11 1-4. Under most favorable conditions, such as never pertain to automobile practice, we could for a few moments show more than the 11 1-4 horsepower. Actually in practice we doubt very much whether our motor shows over 8 horsepower, and as our motor is built with extremely large intake and exhaust valves, with well-proportioned timing, with the valves themselves arranged with an angle with reference to the opening of the cylinders, so that a very free intake and exhaust is had, we are convinced that our motor will give equal results with any motor with similar piston displacement.

Any test for horsepower, to our minds, should be taken with the normal work the motor can stand for 10 hours already running. The writer has seen a great many tests made of cars which are catalogued at high horsepower, and these tests are generally made in the following way.

The motor is put on a block, circulation of the water is arranged by the water being run through from outside sources, so that the pump of the motor is not employed; the fan is not used. This alone on high speeds on a motor of 45 horsepower will consume from 1 to 2 horsepower. Lubrication is the very best. Every possible arrangement is made for speeding the motor up. The motor is brought to its maximum speed, and the brake applied for a few moments, possibly 5 minutes. Under these conditions, you are able to get an enormous horsepower. Actually, with even all these conditions perfect, if you will allow the motor to go down to its normal load, it would drop fully 33 1-3 per cent.

The maximum amount of horsepower that can be squeezed out of a motor under abnormal conditions, to our minds, is not the legitimate horsepower of a car, although this is the rating most American cars use. The normal working horsepower is what should be used.

If we have not been improperly informed, our term horsepower is based on the work one normal dray horse can do, working 10 hours a day, under normal conditions. This, after a series of horses were tried out and after a series of tests were made, worked out to 33,000 foot-pounds a minute, in other words, one horse could lift continually for 10 hours working 33,000 pounds 1 foot for each minute of the ten hours.

This is the normal work of the horse. The spasmodic effort that he can make to pull a wagon out of the mud is not his true power any more than the spasmodic effort an automobile engine can make is its true power.

Power of Long-Stroke vs. Short-Stroke Motor

Now with regard to the long-stroke motor, there are many engineers who are not at all convinced that the long-stroke motor will develop as much power as the short-stroke motor. The whole thing resolves itself down to piston speed, and the mean effective pressure in relation to the piston speed. It is not good practice on a long-stroke motor to run any higher compression than on a short-stroke motor. You are limited with regard to your compression to get proper results. On the long-stroke motor your mean effective pressure will be lower than on the short-stroke motor, as you have a longer time for the gas to expand and it will exhaust at lower pressure than on the long-stroke motor. This will mean greater efficiency, but not more power. The short-stroke motor will start off with the same initial pressure and will exhaust at a much higher pressure and will have a very much higher mean effective pressure. A large part of the power will be wasted in the exhaust.

Of course, the short-stroke motor will develop a much higher revolution per minute than the long-stroke motor. In this way the piston speed is made equal or greater than the long-stroke motor, and a greater mean efficiency pressure is had. Under these conditions the short-stroke motor will show more horsepower than the long-stroke motor.

The advantage of the long-stroke motor has, however, is greater efficiency per pound of fuel consumed, for the long-stroke motor does not exhaust its gas at such a high pressure, uses its gas for a longer time and gets more horsepower out of the same amount. The long-stroke motor is undoubtedly more efficient from an economy standpoint, but there is no reason to believe that we know of that it will develop any more, if as much, horsepower as the short-stroke motor. If this be true, as I believe it is, the long-stroke motors should not be catalogued at any greater horsepower than the short-stroke motors, possibly at lower horsepower.—C. N. Kelsey, Kelsey Motor Co.

Combustion Chamber Contents as Basis—Wadsworth

Cleveland, O.—Editor The Automobile:—I believe that in event of dissatisfaction with the present taxation system that the only logical basis for a new method of taxation must be that of cubical contents of the combustion chamber. One taxation is determined by such a method, the problem of designing an economical, powerful and efficient motor of small bore and stroke is put squarely up to the designer.—G. R. Wadsworth, Peerless Motor Car Co.

(To be continued.)

Runabout Body for Pathfinder Chassis

Double-Dropped Frame Permits Low Body Position—Large Gasoline Tank and Ample Luggage Space Provided

RUNABOUT body designs vary to a greater degree and present a wider range of ideas in car superstructure than any other form of body classification. This is no doubt partly due to the low first cost of a runabout body, and the opportunity that this opens up of having a body built to suit individual taste, rather than to purchase a stock article. Also it is more particularly a man's car and a man is not bound by conventional lines when ordering a body that is to be used exclusively for his own pleasure and requirements.

The design here illustrated is not freakish in any way and will be found suitable for the purpose of a general knockabout for a great many people.

The runabout body can be divided into two general classifications: those with and those without doors. The design presented is one with doors and is shown mounted on a Pathfinder 40 chassis, having 120-inch wheelbase, 36 by 4-inch tires and right side drive. The chassis frame is of the double-drop pattern, permitting a low body position and low center of gravity.

The stock chassis requires no alteration to accommodate the new body. The horn, which is under the hood, the electric lighting system, the dual tire carriers at the rear and the fenders, both front and rear, also remain normal as in the stock car. This use of the regular equipment as much as possible cuts down materially the cost of installing the new body.

Fig. 2 shows the side elevation of the complete assembly. It will be observed that the doors on this body are large and set well back, and though the steering wheel is on the right side, neither this nor the change and brake levers prevent a reasonably easy right-side entrance. The distance or space allowed under the wheel to the top of the seat cushion is 7.5 inches and from the rear edge of the wheel to the seat back 16 inches is allowed. The seat cushion is 7 inches thick, well sloped toward the rear and the seating size as shown on Fig. 3 is 39 inches long by 18 inches wide, providing ample accommodation for two people. The legroom from the seat to the dash is also generous and coincides with the other ample body dimensions.

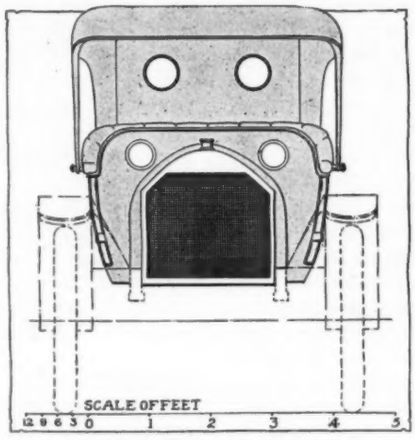


Fig. 1—Front view of body design, showing hood in raised position

Again referring to Fig. 2, it will be noted that the cowl is not fitted with a windshield. There is, however, a good, strong, four-bow, close-fitting top, that is shown both in its raised and folded down positions on this drawing. In stormy weather, curtains are fitted to the top on the front and sides, being fastened at the lower edge to the body. These curtains have celluloid lights and give the protection required. Under the driving seat, the space is utilized for carrying these curtains when not in use, as well as locker space for wraps.

At the rear of the passenger compartment the space is occupied by a combination gasoline and oil tank and the luggage hamper. The tank has a total capacity of 30 gallons, the divided compartments allowing space for 27 gallons of gasoline and 3 gallons of oil. This tank can be removed for repairs very easily, and the hamper to which it is attached furnishes space for carrying one suit case as well as the tool kit. The cover of this hamper is made watertight and in addition there is a small door on each side that allows the space forward of the tank to be

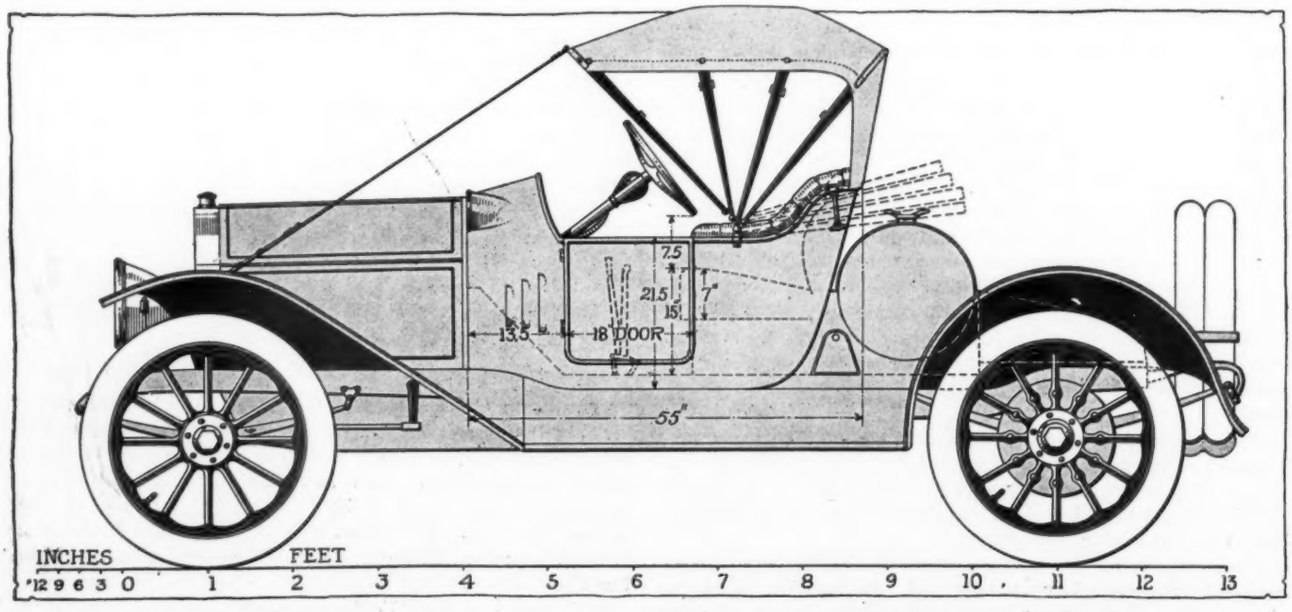


Fig. 2—Side elevation to scale of suggested runabout body with doors, adapted to chassis of Pathfinder 40

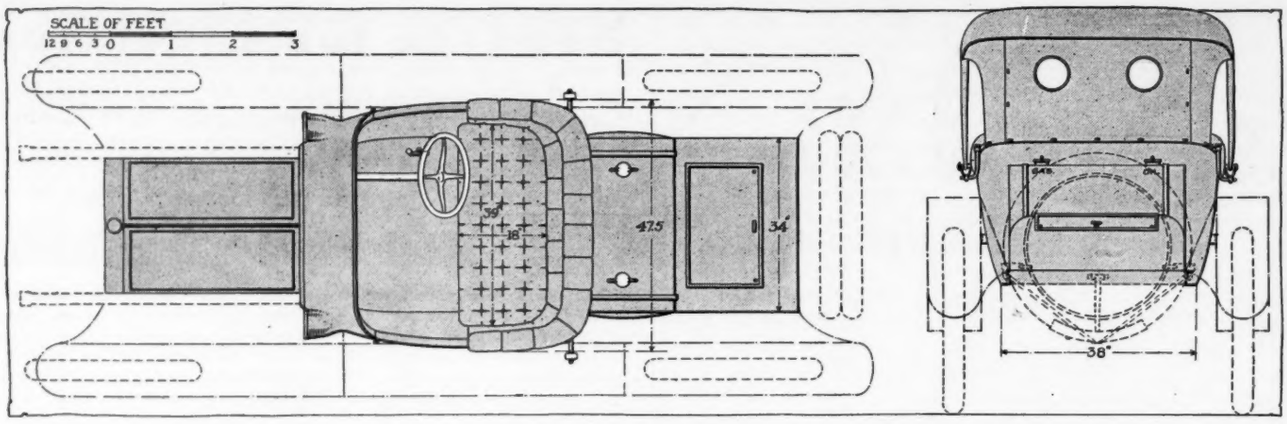


Fig. 3—Plan and rear view, showing location of tank and locker space at rear of seat

utilized for locker room also. Front, plan and rear views of the design, all to scale, are given in Figs. 1 and 3.

The construction of the body calls for aluminum panels for the major part of the body. Steel panels can be used where they are sufficiently flat not to require much beating.

The round tank at the rear is made of 22-gauge steel. The heads are soldered in and the joints wiped to give a smooth paint finish. The two steel bands that hold it in place on the hamper are threaded on each end and fastened with nuts below the hamper framing. The filler caps cover 3-inch openings.

A color suggestion for this design would be battleship gray for both the body and the running gear, black striping with here and there a white hairline stripe to relieve the flat color effect. The fenders could be black and the lamps a combination of black and nickel. Wood finish wherever exposed to be mahogany and the bows of the top, which are of wood, fitted to slat irons, are stained mahogany. The irons are blacked. A heavy khaki material would look well for the top, and the storm curtains of the same with celluloid lights.

The trimming material to be black leather, dull lustre and soft, and the trimming or upholstering of the sides, back and cushions to be a durable, moderately luxurious combination. All the materials for trimming, such as hair and springs must be of the best quality if satisfactory wearing results are desired.

The hamper and body are assembled together when going through the shop, and it is not intended to separate them at any time. This is considered necessary in order to make the joints watertight and thus insure the locker space being kept dry. For the same reason, the cutout under the tank is sealed and drainage is put around the piping.

Ventilation in the front is secured by means of flutings in front of the doors.

The Technical Training of Body Designers

ALTHOUGH every automobilist is acquainted with and takes a pride in the remarkable development of the self-propelled vehicle since its introduction, yet it is rather to be wondered at that so important a branch of this progress as the design of automobile bodies should receive comparatively so little attention. It is only necessary to recall the odd-looking vehicles that first ran under their own power, and mentally compare them with the beautiful lines of the modern automobile to realize what strides have been made in this respect. Not that appearance is the only factor to be considered; comfort and utility are even of greater importance, but these qualities have been attained at the same time as artistic tendencies have been introduced.

With the increasing demand for a good looking car as well as one mechanically efficient comes the need of body designers in large numbers to supply the automobile bodies of the near future. The training of men to fill these posts would seem to suggest the desirability of a new line of education in our technical colleges.

In this connection, the recent visit to Europe of Charles A. Heergeist, technical editor of *The Carriage Monthly*, for the purpose of investigating European methods of technical training, is of interest. This investigation was undertaken on the authorization of the Carriage Builders' Association, and Mr. Heergeist's report has just been published. Schools in England, France, Germany and Austria were visited. Among these the report of one at Vienna seems of especial interest:

"The Austrian Bureau of Public Works in Vienna supports an industrial establishment in which sample carriages and automobiles are designed and built by pupils desiring to perfect themselves in the art of constructing high-class, up-to-date work. Five different trades—designing, body building, smithing, painting, trimming and finishing, all most difficult to learn—are taught in this school. This establishment is open to employers, workmen and helpers, and all those between twenty-four and forty-five years of age are eligible.

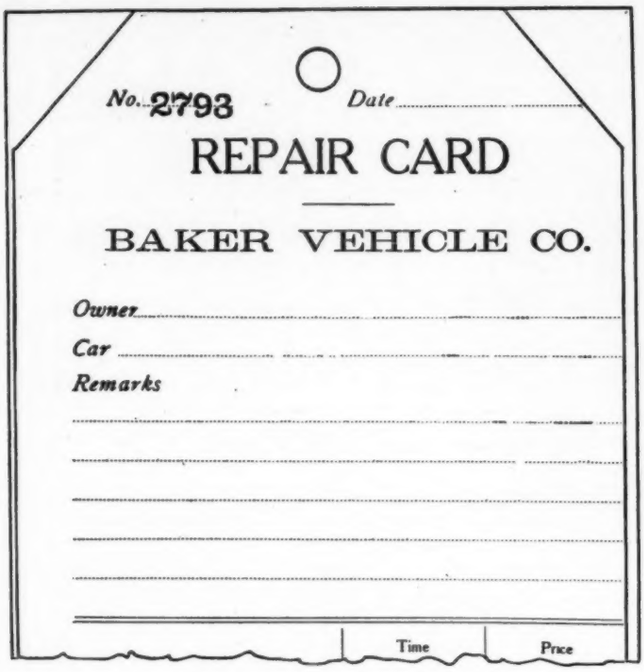
"A full course in building carriages in the white occupies eight weeks; body and smith work, or painting and trimming, six weeks, all ten hours a day. This time may be extended, however, in special cases, and the course may even be repeated when desired.

The circular issued by the Vienna school announces courses as follows:

"Theoretical exercise, drawing, accounting, bookkeeping, machinery, technology, industrial law.—Working in the various branches of carriage and motor car manufacture.—Starting and finishing gear work in wood and iron, building carriage and automobile bodies, movable tops and putting on hinges and lock fixtures.—Gear work and suspending bodies. Top work for limousines, landaus, landaulets and cabriolets, including all the necessary fixtures.—Painting and varnishing carriages and automobiles.—Trimming and finishing interior and exterior of carriages and automobiles.

"Each course in all its branches is free, and, besides, paper, drawing instruments, pens and other necessaries are furnished free of cost. These schools have been established about three years, and the results have been exceedingly satisfactory.

"All the drawings and writings made by the workmen are their own property, while the bodies, finished carriages and automobiles are sold to those who have made them, and are auctioned off to the highest bidder. This is done not only to prevent competition with other concerns, but even to destroy all thought of it.



No. 2793 Date

REPAIR CARD

BAKER VEHICLE CO.

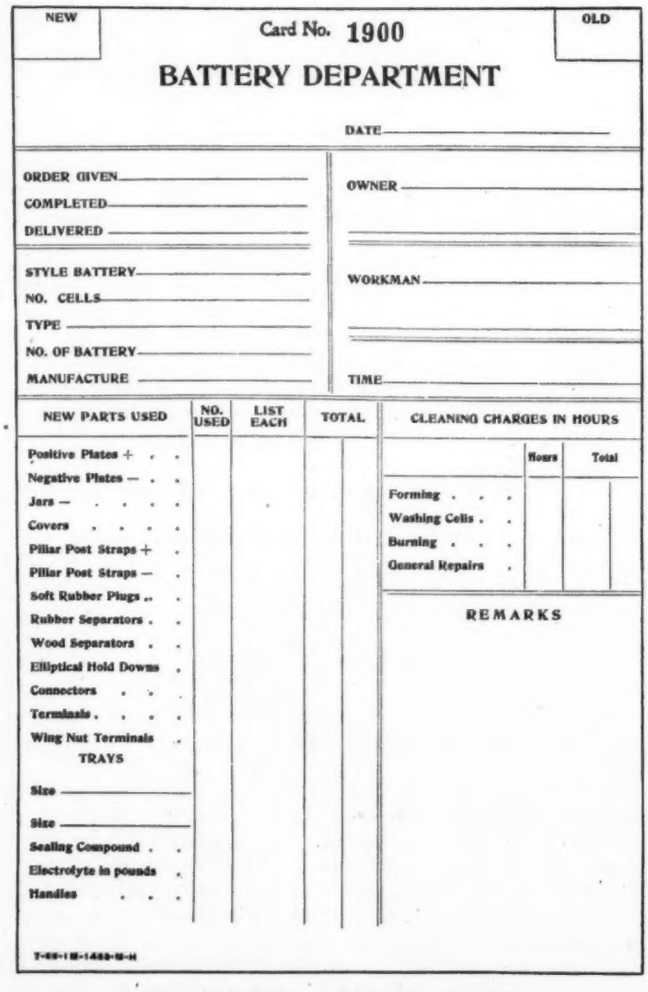
Owner

Car

Remarks

Time | Price

Fig. 1—Baker Vehicle Co.'s repair card



NEW | Card No. 1900 | OLD

BATTERY DEPARTMENT

DATE

ORDER GIVEN
COMPLETED
DELIVERED

OWNER

STYLE BATTERY
NO. CELLS
TYPE
NO. OF BATTERY
MANUFACTURE

WORKMAN

TIME

NEW PARTS USED	NO. USED	LIST EACH	TOTAL
Positive Plates +			
Negative Plates —			
Jars —			
Covers			
Pillar Post Straps +			
Pillar Post Straps —			
Soft Rubber Plugs			
Rubber Separators			
Wood Separators			
Elliptical Hold Downs			
Connectors			
Terminals			
Wing Nut Terminals			
TRAYS			
Size			
Size			
Sealing Compound			
Electrolyte in pounds			
Handles			

CLEANING CHARGES IN HOURS	Hours	Total
Forming		
Washing Cells		
Burning		
General Repairs		

REMARKS

T-69-1M-1488-M-H

Fig. 2—Baker company's battery record

Service for Electrics

Complete Service Agreements Are Common and Simple Record Systems Becoming Popular in Large Cities

Besides special forms for recording repair operations made on batteries, electric-car service departments use much the same style of records as other stations, especially for compiling information which relates to repair work, a most important part of service. Where cars are stored in the service department, using it like a garage, a checking sheet supplements the cards here illustrated.

WHILE gasoline-car service stations are undoubtedly ahead of electric ones with regard to elaborate systematic organization, the latter are fast following. The efforts of the responsible men are best indicated by describing the principal features of service for electric cars given in New York and the surrounding territory.

A number of companies, among them the Baker and the Rauch & Lang, are giving complete service in their own garages. This service includes electricity, lubrication, washing and polishing and delivery of the car to the owner's house as well as calling there for it, both once a day. A charge varying from $35 to $55 a month—which, however, does not include the cost of repair work done without the guarantee—is made for this service; also, if the car is sent to and from the garage more than once a day, the time of the man driving it is charged to the car owner.

As for repair work, in the case of the Baker branch, owners, when desiring a repair job done on their cars, telephone to the manager of the company who is in the salesroom. The latter instructs, also by telephone, the service department's shop foreman and requests the car owners to drive their cars to the department, where the foreman is ready to have the necessary repairs made at once, if they are small, or in the shortest possible time, if they cannot be carried out immediately.

In the case of the Rauch & Lang service, the owner, when confronted with suddenly-arising trouble, communicates with the service department much in the same manner. Incidentally, this company's service includes the inspection, by service department men, of the car every-now-and-then so that necessary repairs may be made before their need has grown too urgent.

The Hupp-Yeats service station in New York City consists merely of a repair shop where inspections of the cars are made upon request of the owner and where broken or misadjusted parts are replaced or put in proper shape. It is a repair department and spare parts store. No arrangement is provided for a full-care scheme as in the case of the other companies.

The systems, too, which are used in these electric service departments, are rather elementary. A repair card for noting repairs made by the owner and checking them off, as they are being executed, together with a battery card for recording details when working on a car battery, are, as a rule, all that is used Four of these forms are described and illustrated here.

Fig. 1 shows the general repair card used by the service department of the Baker Vehicle Co. This card is in form of a tag so as to be suitable to be attached to the steering lever or any other suitable part of the car, when the latter is brought into the repair shop. The card is 4.25 by 9.25 inches, printed black on tan cardboard and numbered, all cards being issued in series and bearing consecutive numbers. The use of the card is as simple as its design. When a car is brought in to be repaired—it does not matter whether the owner waits for the work or not—the foreman who takes the car over from him makes notes on the card of the owner's name and address, the number of the car and the required repair operations. Of course, the card is dated.

The work having been outlined on the card or tag, and the latter affixed to the automobile, the same is turned over to a shop worker or more to carry out the work. The man who does the work then fills out the lower part of the card—filling practically one-half of it—which is ruled for this purpose, with spaces for three columns. In the first column, the nature of the repair operation and the name of the man doing it are given; in the second appears the time in hours and minutes consumed by the man's work, and in the third the wage paid to the man for this work. If two men are on the job, each fills out a line referring to the operation, giving the name of the same as well as his own, and stating the time spent on the job. Following is a sample of how the card is filled out:

Taking up steering-gear play (Jones).....45 min., 37 cents

In a similar manner, the reverse side of the tag is ruled to form three spaces, for parts or materials used, unit prices thereof and the total price to be charged to the customer for a quantity of material or parts, as per example:

Fourteen feet of wire to motor... .....25 cents, $3.50

It is seen that by thus ruling the card with spaces for recording both time and materials used as well as their costs, a complete record of the cost of a repair job is obtained. Naturally, this card is supplemented by the weekly clock card used by all workers of the shop and requisitions whenever material is drawn from stock. This requisition gives the nature and quantity of the material needed and the number of the job for which it is made out, but it is designed much in the same style as other requisitions, and such having frequently been shown and described in THE AUTOMOBILE, it is thought superfluous to illustrate it here.

The Baker company also uses a special card in connection with battery repairs. This nature of work, constituting one of the most frequent requirements of electric cars, is so apt to run into details of which there are many, that it is worth while to have a special card and not make notes on a general repair card. The Baker company's card is 6 by 9.25 inches, printed black on tan cardboard and numbered. Fig. 2 shows that there are fully thirty-three spaces on the card, to say nothing of those for the date and special remarks. If a battery is brought in for repair, the card is filled out with the date and under remarks facts given by the owner or driver are noted. Then the shop worker taking care of the work fills out the spaces describing the battery and giving details which relate to its distinguishing marks, such as make, number, etc. The names of owner and workman having been filled out, the work is taken up and as it proceeds, the workman makes notes on the card of all parts drawn from stock to replace worn-out battery parts. The unit price to be charged, the number of parts used and the total net price to the owner are filled out in every case of replacement. Definite charges made for forming, washing or burning the cells are recorded and so is the time spent by the worker or workers on the job.

The Hupp-Yeats service forms are also used for R. C. H. cars and consequently do not seem to be specially suited for electrics, although they fill every requirement. The main card of the system is Fig. 3, 9.75 by 8 inches, which is printed black on tan cardboard and is made out with a duplicate on thin white paper. Or, rather, the white copy is made out a carbon duplicate on cardboard. Anyway, the latter copy goes to the shop with the car, while the white copy goes to the office. When making out the form, the repairman fills out the owner's name and address and the work to be done, as well as data referring to the car itself. This having been done, the owner or his representative who brings the car and orders the work, signs the card to authorize the job. Then, as the work is done, the various items are checked off as they are taken care of. On the shop card, no time spent or material used is entered, but time-distribution cards and requisitions serve to record this information, and the latter is put in suitable form when the job is complete and all the relevant forms are turned over to the office.

To put the records in the proper form, the blank, Fig. 4, is used. This is printed on the reverse side of the office copy of Fig. 3, and is so designed that every line permits of recording a repair operation, the number of the employees who did it, the time used and wage paid for the same, the materials used and their price, both the cost to the company and the amount to be charged to the customer. Of course, this side of the blank is also stamped with the number of the repair order and by keeping the various office copies of these orders filed—either alphabetically under the owners' names or by numbers with a cross index for the names—the information relating to all repairs is kept in accessible and tangible form. Naturally, the total labor accounted for must be equal to the total of clockcard times.

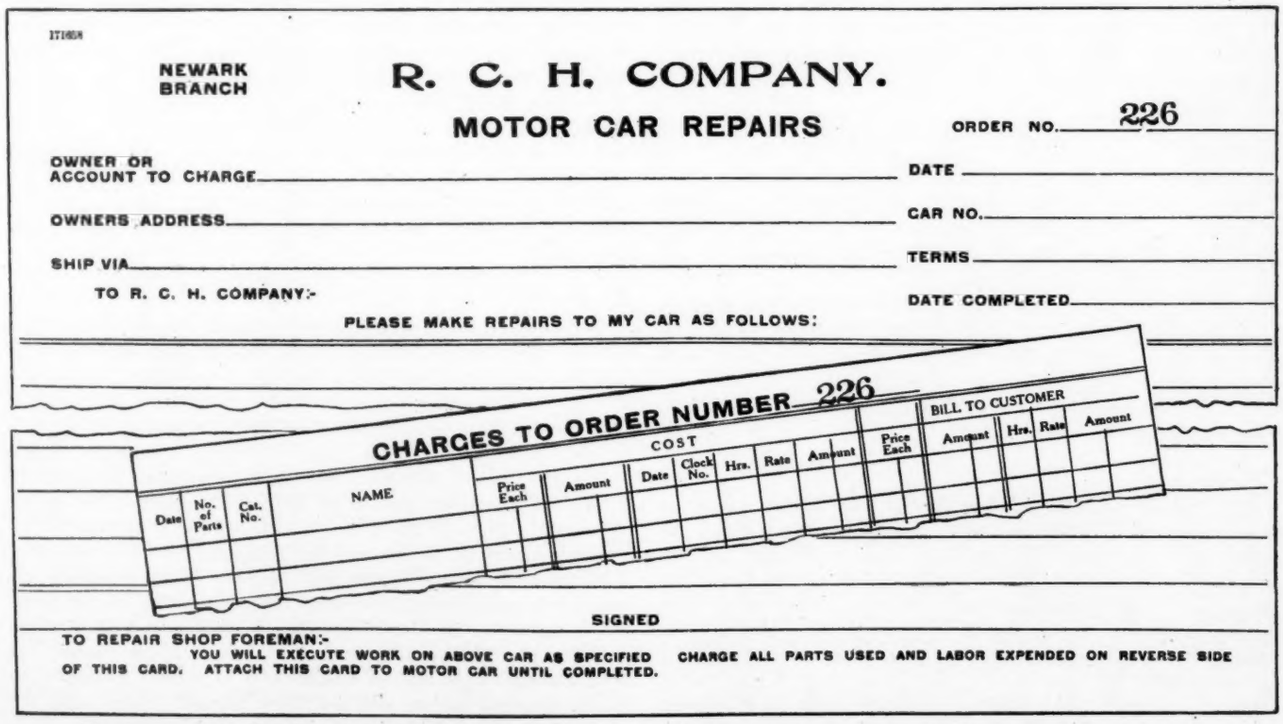
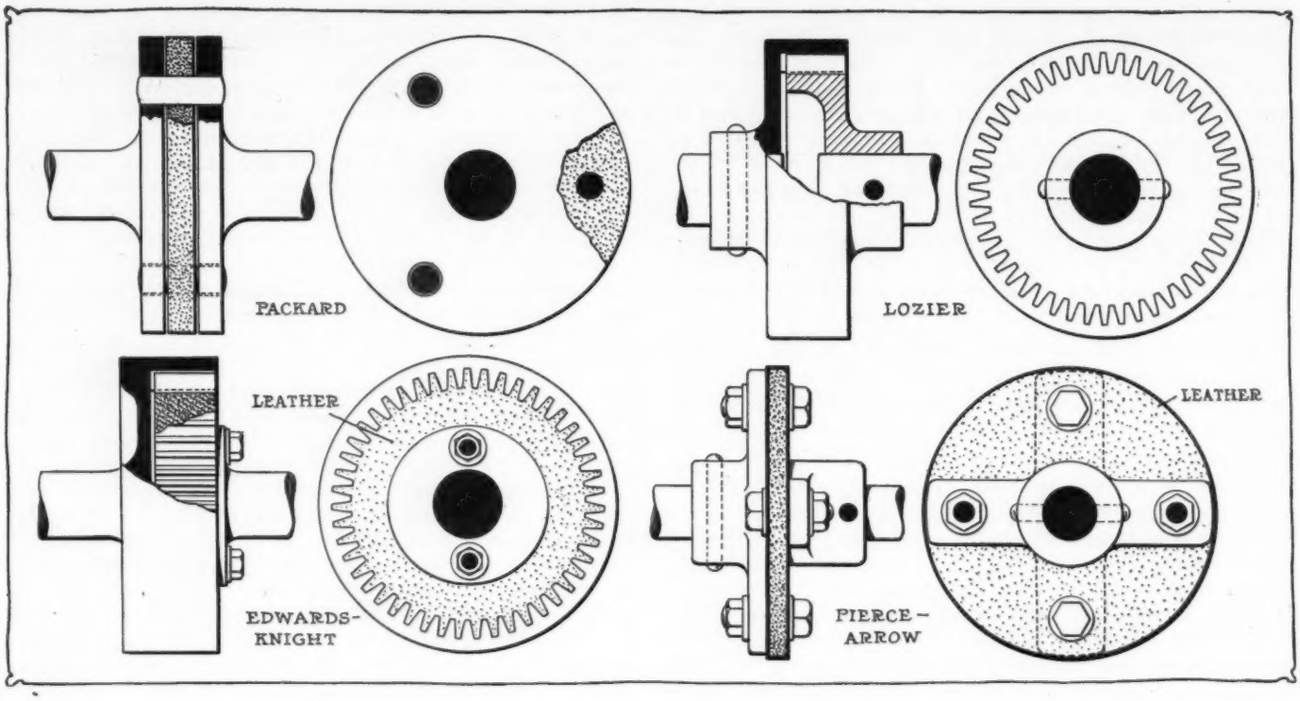


Fig. 3—Repair work record used for Hupp-Yeats electrics. Fig. 4—Accountant's cost record on back of office copy of same



Novel Magneto Couplings for 1913

SILENCE, accessibility and flexibility are the three big requirements of a magneto or water pump shaft coupling. Automobile manufacturers have tried in various ways to secure this combination and many ingenious forms of shaft connection are to be seen on the cars that have been produced during the past few years. Leather has proved a popular material for transmitting the turning effort on account of its toughness and flexibility. The feature of silence is also one of the points for recommending this material. Among the important car manufacturers who employ leather in the magneto couplings may be mentioned Pierce, Packard, Stevens, Stearns, Premier, Haynes and Columbia.

Other concerns have pinned their faith to rubber. The Velie is prominent in this respect, employing a magneto coupling in which the drive is transmitted through a solid rubber disk.

Others have various arrangements in which metallic devices of a more or less flexible nature are used. Laminated springs have been found excellent and the Bosch Magneto Co. has brought out a device of this type.

A few years ago the use of the Oldham coupling for magneto work was very extensive. It was found that after a few hundred miles of running this type of connection became noisy through wear. The Oldham coupling, in order to be efficient, needs a close engagement between the splines and grooves, otherwise a small knock will develop.

Packard

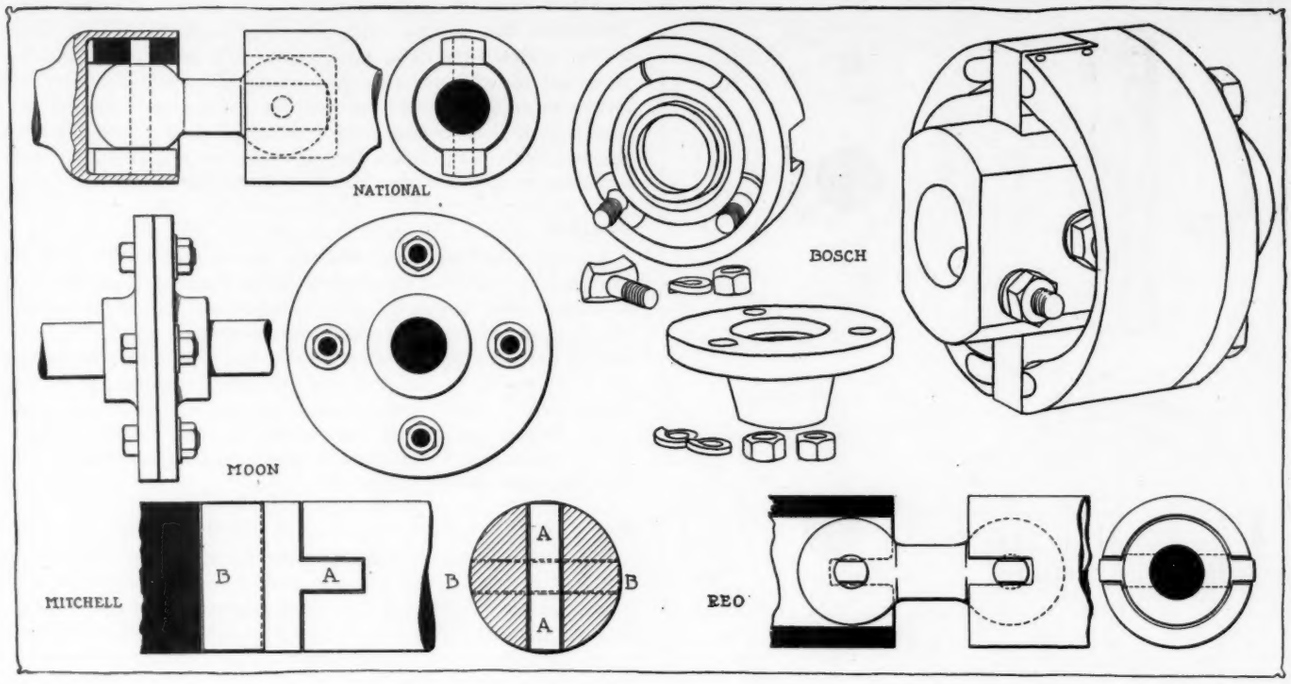
The Packard magneto drive is through two flanges which are pinned together by three pins and a leather washer which is inserted between them. This forms a rigid drive, none of the power being transmitted through the leather as the two shaft flanges are pinned firmly together. The use of the leather disk in this instance is merely for the sake of silence. There is no metallic contact between the two flanges and hence, even if a certain amount of wear should take place, there would be no clashing of metal. The Packard magneto drive is illustrated in two views herewith. The cross-sectional view shows the two shaft flanges with the leather disk placed between and the end view shows the arrangement of the drive-transmitting pins.

Lozier

Lozier uses a different scheme in transmitting the drive to the magneto. A study of the above sketch shows the Lozier scheme, which is along the lines of an internal gear. The gear is not used as such, it must be understood, as the teeth merely mesh with a toothed annulus. The gear is of bronze and the teeth of steel. It is evident that with such a large bearing surface, the drive is not likely to ever work loose. The drive is transmitted directly through these teeth from the magneto driveshaft to the driven shaft. The annulus is supported by a collar which bolts to the magneto shaft. When it is desired to change the timing it is only necessary to slip the gear wheel out and slip it back so that it is rotated one or two teeth. This renders an indefinite number of adjustments possible with this type of connection.

Bosch

One of the most notable couplings to be found among those now in use is that brought out by the Bosch company. The drive in this coupling is transmitted through a laminated spring and the timing adjustments can be made directly at the coupling. The coupling is shown in some detail at the right on page 897. It consists primarily of three parts, a driving member, coupling sleeve and driven member. The driving member is a slotted block through which passes the laminated spring. The spring projects through the block and is held within it by bolts. The coupling sleeve is slotted and the laminated spring which projects from the block engages with the slot in the coupling and forms the transmitting feature of the drive. The driven member is bolted to the slotted coupling in such a way that it can be adjusted. The adjustment feature is secured by passing the bolts through slots and in adjusting it is merely necessary to loosen the bolts and to slip the sleeve around on the bolts the required distance. This form of magneto drive is more elabo-



rate than that usually seen because it includes both the flexibility and the adjustment features, one being secured by the spring and the other by the bolts passing through the slots.

Moon

For motor-generator drives the flexibility feature need not be considered because all the connections are rigid and since a large amount of power is transmitted by the cranking motor rigid connections are used. For instance, the Moon motor generator connection is that shown above, over the name Moon. The magneto drive has the additional feature of a leather washer slipped between the two flanges of the coupling. All the 1912 Moon cars had double-jaw universal joint connections for the magneto coupling, but in mounting the motor generator on the 1913 cars the designers have used the same type of drive for the magneto. The leather washer gives the touch of flexibility and silence to the magneto coupling which has been sought in the campaign against noise which has been instituted by automobile engineers in the past few years.

Edwards

Similar in many respects to the Lozier gear is the one employed on the Edwards-Knight car. On the latter, however, the gear wheel is of rawhide and further obviates any possibility of noise. The leather gear is carried by two stud bolts on the driveshaft from the timing gears and the collar containing the annulus into which the gear meshes is a fixed flange on the magneto shaft. The drive is thus in a measure flexible as it passes through the leather. It must be remembered, however, that the leather is of such thickness and toughness that there is no perceptible yielding to its action and no stretch whatever. The part sectional view given on page 896 shows the rawhide gear to be of considerable width giving sufficient beating surface to prevent the possibility of a loose connection. To make a change in the timing it is only necessary to pull the rawhide gear out of the annulus and advance or retard it a couple of teeth. No metallic contact exists between the driving and the driven members of this connection.

Pierce

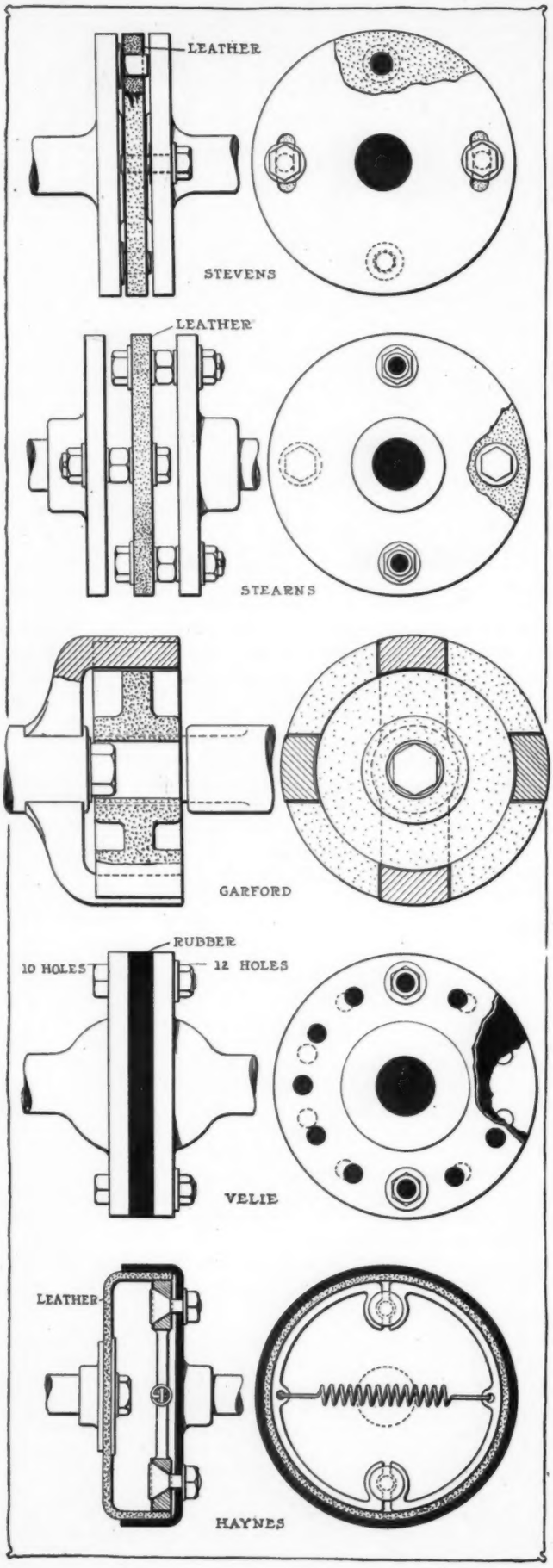
Another method of employing leather and one which has met with success in the Pierce-Arrow and other makes is that shown under the name of this concern in Fig. 1. The members in this drive are so arranged that there is no metallic contact between the driving and the driven members. The adjustments are not made at the coupling proper, but by means of an internal gear at the end of the shaft at the point at which the shaft passes through the timing gear casing. The connection used is in reality a cross-connection because the driving support and the driven are at right angles to each other. The drive is all transmitted through the leather and the strain equally distributed between the four quadrants of the leather disk. The leather is thus held at four points, equally spaced, on its circumference. The points at the extremities of one diameter are the driving members and the points at the extremities of the other diameter are the driven members.

National

Radically different from any of the preceding types is the magneto connection on the National car. This is shown at the left top of the page. It is purely and simply a universal joint of the double-ball type. The driveshaft and driven shaft each terminates in a jaw into which is fitted a liner. Between these shaft terminals is a short universal shaft with each end terminating in a ball. As may be seen in the illustration, the jaws slip over these balls and a pin passed through each. It will be noted that the pin in one ball passes through at right angles to the pin through the other ball. This gives flexibility in two directions and takes care of any changes of alignment in the shafting. The National coupling is not adjustable as far as changes in timing are concerned; these are made independently. The big feature of this type of connection is its flexibility and its tendency to avoid wear because it automatically takes care of any misalignment which may take place.

Stevens-Duryea

On the Stevens-Duryea cars an adjustable drive through leather is employed. At the top of the illustration on page 902 two views of this drive are given. It will be seen that the leather is in disk form and is placed between the driving and driven shaft flanges. Each shaft flange is connected to the leather at two points, one on the vertical and the other on the horizontal diameter of the leather disk. This arrangement makes a positive drive through the leather itself as there is a quadrant of the leather disk which separates the connecting point of the driving shaft from the connecting point of the driven shaft.



This gives a slight flexibility in the drive itself and at the same time takes care of any changes in alignment which may occur in the shafts. The adjustment feature is included by having slots instead of holes through one of the shaft flanges. To make the adjustment the nuts on these bolts are loosened and the flange slipped around a short distance. A drive of this kind can be quickly taken down for removing the magneto, it is only necessary to remove the bolts and pull the connection apart.

Mitchell

A coupling similar to the Oldham type is used on the Mitchell car. It is a much more rigid proposition than the common form of Oldham, the flanges being much stronger. The main feature of the connection is a central disk with two rigid diametric flanges at right angles to each other. One flange is mounted on the driving side of the disk and the other is mounted on the driven side. These flanges act as splines and engage with grooves in the driving and driven shafts. This is an exceedingly light type of coupling, the finished job not having a greater diameter than the shaft itself.

Reo

The Reo magneto coupling is somewhat similar in appearance to the National coupling just described. Instead of the pins in the universal joint passing through at right angles to each other they are parallel. This is a flexible joint and readily takes care of the 1-32-inch misalignment that sometimes occurs between the drive and magneto shafts. Although the Reo magneto coupling is not adjustable, slight changes in timing can be effected in a shop by slightly twisting the universal ball shaft. One of the balls is clamped in a vise and a 12-inch wrench put on the other and a slight degree of change in timing can thus be secured. Other changes can be made at the timing gears in the usual manner by slipping the gears around one or more teeth in the order of meshing.

Stearns

A unique method of employing the leather disk between the shaft flanges is that seen on the Stearns cars. With this drive the leather takes all the power transmission and no metallic contact exists between the driving and the driven shafts. There is no chance for any noise to develop or a knock to occur because the bolt holes have become worn. The flange connections are at the extremities of opposite diameters, as in the case of many other leather-disk drives, but the novel feature is the use of a nut as a separator between the leather disk and the flanges. A longer bolt than usual is used. Each bolt passes through three parts, the shaft flange, the leather disk and a hexagonal nut placed between the flange and the disk. This gives an extremely flexible connection because the leather has enough clearance to get all the play that could ever develop in practice. Owing to the method of assembling this connection it is comparatively easy to take it down. It is only necessary to remove the bolts which hold the leather disk in place because the flanges are so far apart that the shaft can readily be slipped out when this is removed.

Garford

The Garford coupling is a variation of the cross coupling with the drive transmitted through a fiber block. As may be noted in the sketch, a collar carrying two arms is slipped over the magneto shaft and keyed thereto. The arms of the collar engage with the slots in the fiber and transmit the drive to them. The fiber block is keyed to the driving shaft. This is not an adjustable coupling and any changes made in the timing are made at the gears. There is no metal-to-metal contact between the driving and the driven parts of the connection and no noise can occur as the result of wear.

Velie

Instead of rawhide or leather, the Velie magneto coupling includes a disk of rubber. This elastic material fulfills the same pur-

pose as does the leather in similar couplings. The Velie coupling consists of two metal flanges, one on the driving and the other on the driven shafts. Between these two flanges is the rubber disk used for silencing the drive and at the same time for giving it the necessary play. The adjustment feature of the timing is an actual part of the coupling and is arranged as follows: One of the metal flanges is pierced by ten holes all equally spaced around the circumference and the other flange is pierced by twelve holes. Since both the circumferences are the same size the holes form a sort of Vernier adjustment. One circumference is divided into tenths and the other is divided into twelfths, the minimum amount of variation that can be made will be the difference between 1-10 and 1-12 of the circumference of the circle, or 1-60 of the circumference. Since there are 360 degrees to a circle the adjustments can be made in spaces of 6 degrees.

Haynes

The Haynes coupling, although driving through leather, employs a different method of rendering the coupling flexible. The leather, as shown in the sketch at the bottom of page 898, is of cup shape instead of a disk. The cup is clamped at the bottom to the driven shaft and is fastened to the driving shaft by squeezing the flanges of the cup between a metal flange and a retaining ring. The retaining ring is split and through the openings made by the split there passes a small cone, as shown in the sketch. This cone acts in the nature of a wedge. The wedge action is secured by taking up on the nut passing through the axis of the wedge cone. This spreads the ring apart and holds the leather tightly. If the adjustment is to be changed it is only necessary to loosen the locking ring and slip the coupling around as much as desired and then retighten the wedges. The spring passing across the locking ring holds the segments tightly against the little cone-spreading wedges.

Studebaker

The Studebaker is a positive adjustable drive. The sketch at the top of the page shows it to consist of two metal flanges bolted together by two through bolts. One of the flanges is pierced by several holes spread around the circumference to make it possible to change the timing if desired. The power from the driving to the driven shaft is transmitted through the two bolts, which thus perform the double function of driving members and adjustment points.

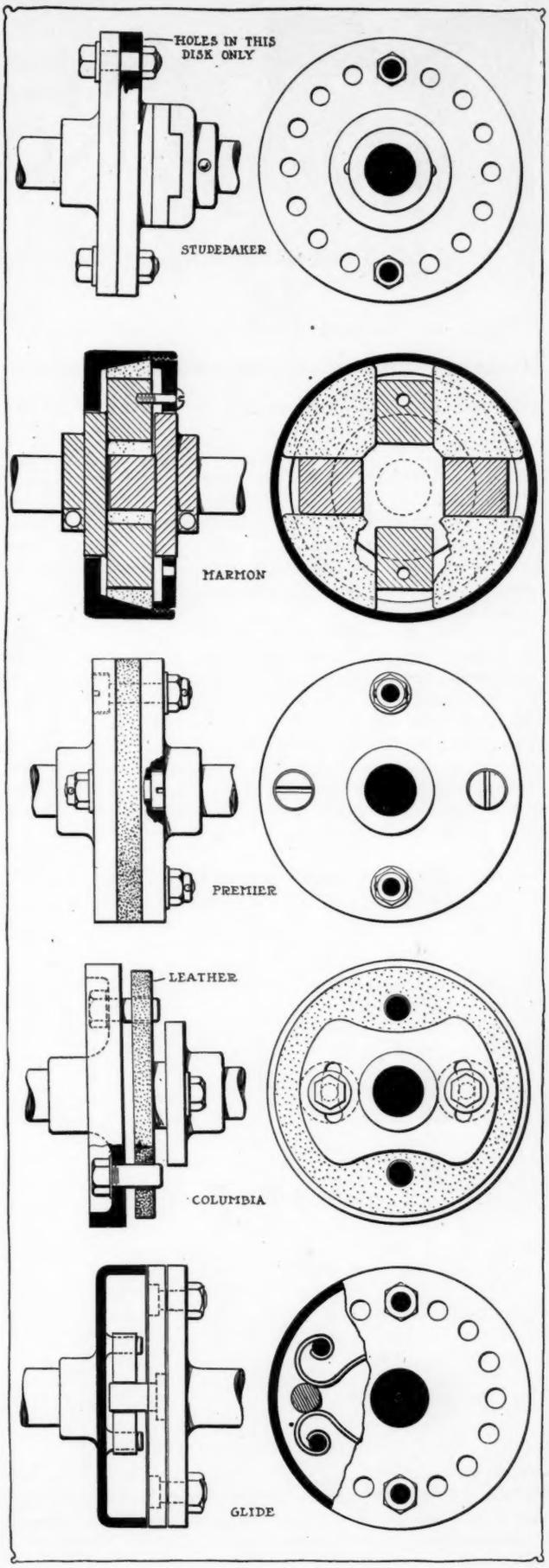
Marmon

A cross-coupling type with fiber filling blocks is used on the Marmon for 1913. As may be seen in the illustration at the right, the principle employed is somewhat similar to that used in the Garford design, except that the fiber filling blocks are separate pieces instead of being a single piece cut to take the jaws of the coupling. The Marmon device consists of a housing, shown in black in the illustration, and two collars secured to the drive shaft and the driven shaft respectively by means of key pins. The jaws of the coupling are integral with the collars, two jaws forming a part of each collar. One of the distinguishing features of the Marmon design consists of the tapered face on the fiber filling blocks through which the drive is transmitted. The tension between the faces of the blocks and the housing of the coupling is regulated by loosening the lock screw shown in the illustration and turning the right side of the housing face as indicated by the thread lines in the sketch. This coupling is designed for durability and silence in operation.

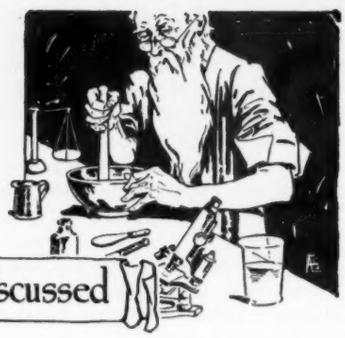
Premier

The Premier magneto coupling consists of two flanges keyed respectively to the driving and driven shafts. Between these two flanges is inserted a leather disk to fulfill the purpose of deadening the sound. This is a rigid connection, the drive is transmitted through the bolts which pass through the two flanges and through the leather disk between them. No need of play is felt to be necessary on the Premier car as the part carrying the

(*Continued on Page 907.*)



The Rostrum



In which Letters from Readers are Answered and Discussed

Effect of Wheel Size on Speed—Decarbonizing with Kerosene Vapor—Packard School of Salesmanship — Latent Heat

More Speed with Bigger Wheels

EDITOR THE AUTOMOBILE:—What would be the difference in speed of two cars, one gear ratio 3.5 to 1 with 32-inch wheels and one with 3.5 to 1 with 34-inch wheels. How much faster would the one with 34-inch wheels go? Both cars have the same bore and stroke, 4.00 by 4.50.

Lee, Ill. E. W.

—Assuming that both motors are turning over at the same speed, the speed of the cars would vary as the square of the diameters of the wheels. Calling the speed of the car with the 32-inch wheels A and that of the 34-inch wheels B, the proportion $A : B :: 32^2 : 34^2$ or $A : B :: 1{,}024 : 1{,}156$.

At any speed the car having the 34-inch wheels would be traveling 1.13 times as fast as the car having the 32-inch wheels. At a speed of 30 miles an hour for the 32-inch wheel car the 34-inch wheel car would be going 33.9 miles an hour. This is 13 per cent. faster than the car with the smaller wheels.

Pinching Inner Tubes with Iron

Editor THE AUTOMOBILE:—I have noticed that several of the inner tubes on my car have an appearance as if they had been chewed by the tool when putting on the tire. The tubes blow out through these weak spots and I would like to know if the rubbing of the iron against the tubes would be sufficient cause for these blow-outs? It is quite an expense and if I could check it with a little extra caution I would like to do so.

Yonkers, N. Y. SUBSCRIBER.

—Ten per cent. of the inner tubes on clincher tires are bruised by careless handling of the irons. The tube can be actually punctured in this way or weakened to such an extent that it will blow out shortly. In putting on a tire the tube can be pinched by the iron and also by the bead of the casing, as shown in Fig. 4. Lifting up on the iron will give the tube a bad squeeze and when the bead slips into place it is apt to catch the tube in the manner shown. In working the tire off it is easy to keep away from the inner tube with the tool if it is used in the manner shown in Fig. 5. The iron is first worked in vertically and then rotated about the rim to a horizontal position.

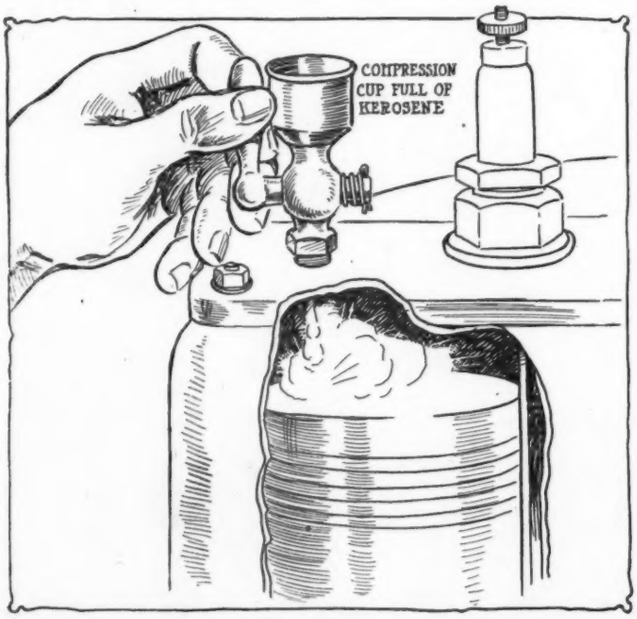


Fig. 1—Kerosene should be put into the motor while hot. A compression-cup full to a cylinder after the day's run is practice

Kerosene for Decarbonizing

Editor THE AUTOMOBILE:—Kindly let me know the following in regard to the use of kerosene to prevent carbon in motors: I read in THE AUTOMOBILE that you recommend putting a tablespoonful of kerosene in each cylinder after a run. I do not use my car for 3 or 4 days at a time and would like to know if it is necessary to start the motor the following morning or could I leave the kerosene in motor from one run to another.

Stockbridge, Mich. JAS. McC.

—There are two ways of applying kerosene as a decarbonizer. First, directly into the cylinder, and, second, through the intake. The wide difference between these methods is that the motor must not be running when the kerosene is applied directly into the cylinder, because if the petcock were opened when the motor was running the kerosene would be blown back. On the other hand, when applied through the intake the motor must be running in order that the kerosene be sucked directly up into the cylinder.

Fig. 1 shows the application of the kerosene to the cylinder direct. A compression cup full of kerosene is allowed to run into each cylinder after the end of the day's run and while the motor is still hot. As has often been explained in these columns, kerosene vapor is one of the strongest of carbon solvents. It is far stronger than the liquid kerosene which, however, is also a good solvent. When the kerosene runs down on the hot piston and comes in contact with the hot walls it is vaporized and then commences to attack the carbon. The carbon which is dissolved is deposited when the motor becomes cool in a thin, dust-like form. If the compression cup is opened and the motor cranked briskly this dust is blown out. As an experiment, treat the motor in the manner described and then hold a handkerchief over the petcock opening when the motor is spun rapidly.

The other method of applying kerosene is illustrated in Fig. 2. Many old and experienced automobilists swear by this method, stating that it is one of the best methods of freeing the cylinders of carbon. The motor is started and allowed to run briskly. Through the air intake of the carbureter, kerosene oil is slowly poured, a little at a time. This will cause the motor to sputter and misfire and allow huge volumes of gray smoke to come roll-

ing out of the exhaust, but the misfiring is only temporary and the motor soon frees itself of the smoke. About a gallon of kerosene can be profitably poured through the carbureter this way, putting just enough in at a time that the motor will not die.

Many car owners are now using the patented compounds for removing carbon. Some of these are excellent and there are experienced men who prefer them to scraping the cylinders because it is a cheaper process and because the cylinders are left practically as clean as if they were scraped. These liquid and solid carbon removers are either very strong solvents or they burn the carbon out of the cylinders in the same way that the application of salt will burn the black off a gas mantle.

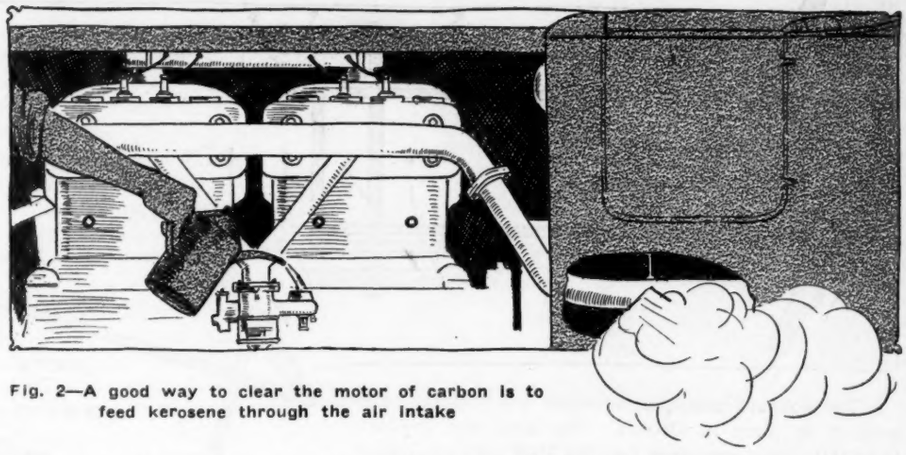


Fig. 2—A good way to clear the motor of carbon is to feed kerosene through the air intake

It is an excellent combination to follow the use of the carbon remover with an application of kerosene, allowing the latter to flow through the air intake of the carbureter in the method just described. The kerosene will positively destroy all the carbon that has been loosened by the stronger solvent or by any other process. If you live in a municipality where it is against the law to allow the car to smoke you should get out into the country before carrying out the work as the objectionable feature to the use of the kerosene in the manner described is the smoke which it causes. It would be well to go some place where noise of the motor is no objection so you will be able to open the muffler cut-out and allow all the smoke to escape to the open air in that way rather than through the motor. The muffler becomes clogged rapidly enough without adding any cause to make it absorb more soot. If the cut-out is opened the soot is deflected and the muffler escapes the heavy discharge.

Weight Affects Fuel Consumption

Editor THE AUTOMOBILE:—Does a car give more speed and mileage to gallon of gasoline with a light detachable rim than a heavier or a demountable? Also what would be the difference in running if the tire was one-third lighter than the average pneumatic? What kind of rims are used on racing machines? Do they have a special tire?

Brockton, Mass. J. W. CLAPP.

—The weight of a car affects the fuel consumption of that car because it requires a greater effort on the part of the motor to take it along the road, and effort on the part of the motor means the consumption of fuel. Every pound added to car's weight means so much taken off the highest attainable speed and also means so much added to the gasoline consumption at any given speed. The difference between the weight of a demountable rim and a quick detachable is so slight that the owner of the car would not notice any great difference in the cost of operating his car when he changed from one type of rim to the other. A difference of one-third in the weight of the tires would make an appreciable difference in the weight of the car and hence a somewhat greater economy as regards fuel consumption, although the difference would be scarcely perceptible. A 34 by 4.5-inch shoe weighs 24 pounds. According to this, the saving in weight would be only 32 pounds on all four tires. The addition of a passenger makes very little noticeable difference in the running of a car and therefore a saving of tire weight would make still less. On racing cars demountable rims are generally fitted, although cars fitted with wire wheels have used the Rudge detachable wheel to good advantage. The reduction of tire wear in races is accomplished by buffing the tires. An ordinary plain tread tire is taken and the surface of the tread removed on an emery wheel to allow the car to be carried practically on the fabric. Instead of decreasing the service of the tire in the race its service is increased instead. The heat can be radiated much more rapidly and blow-outs are prevented. The tires do not give way until worn through the fabric.

Criticizes Morley Spring Suspension

Editor THE AUTOMOBILE:—In your issue of February 20, 1913, you published an article on "A New Spring Suspension," by E. M. Morley. There are a few points concerning his suggestion which I believe make it impractical. He states that the object of using the system is to permit the end springs to oscillate about their supports, thus saving the car from sudden lurches, etc. I cannot see in just what manner this arrangement is to accomplish the desired result. Suppose we consider the accompanying sketch, which represents a frame with two end springs mounted so as to oscillate about their centers, and a center spring shackled to the other two, but rigidly secured to the frame in its middle.

Suppose points A and H to rest solidly upon some support, such as the axle and wheels, and suppose the frame to be depressed vertically. The tendency of the end springs is to revolve on their pivots and pull down C and D on the center spring. At this instant, however, the entire center spring, being fastened to the frame, is also descending and will drop a distance equal to the drop of the pivots of the end springs. Now reversing the process and supposing the wheel to strike a bump: A is forced up and in turn pulls down B and therefore C. But the frame, being rigidly secured to C, is likewise pulled down. In other words, the support N is forced up with exactly the same force with which M is pulled down. The same thing happens, of course, when either of the other wheels goes through the same disturbing process.

Now taking the first case above, in which the frame is descending: it is readily seen that M drops just as far as B and C; A rises through the same distance as the spring is hung at its center. In other words, the effect on the center spring is practically nil as it performs no part of the actual springing of the car. The same effect would be obtained by securing B to the frame immediately above. Even in case the spring were of actual value it should be hung in the opposite direction so that the curve would straighten out with load, and not increase in curvature.

This problem could have been taken up from the graphical standpoint and the different forces and their directions determined, but I think that such treatment is unnecessary, on account of the simplicity of the arrangement.

Ann Arbor, Mich. O. W. HALL.

Packard Company Maintains School

Editor THE AUTOMOBILE:—Does the Packard company maintain a school for the education of Packard salesmen, and what system should an applicant use to get a course in Packard salesmanship?

Lexington, Ky. WM. B. B.

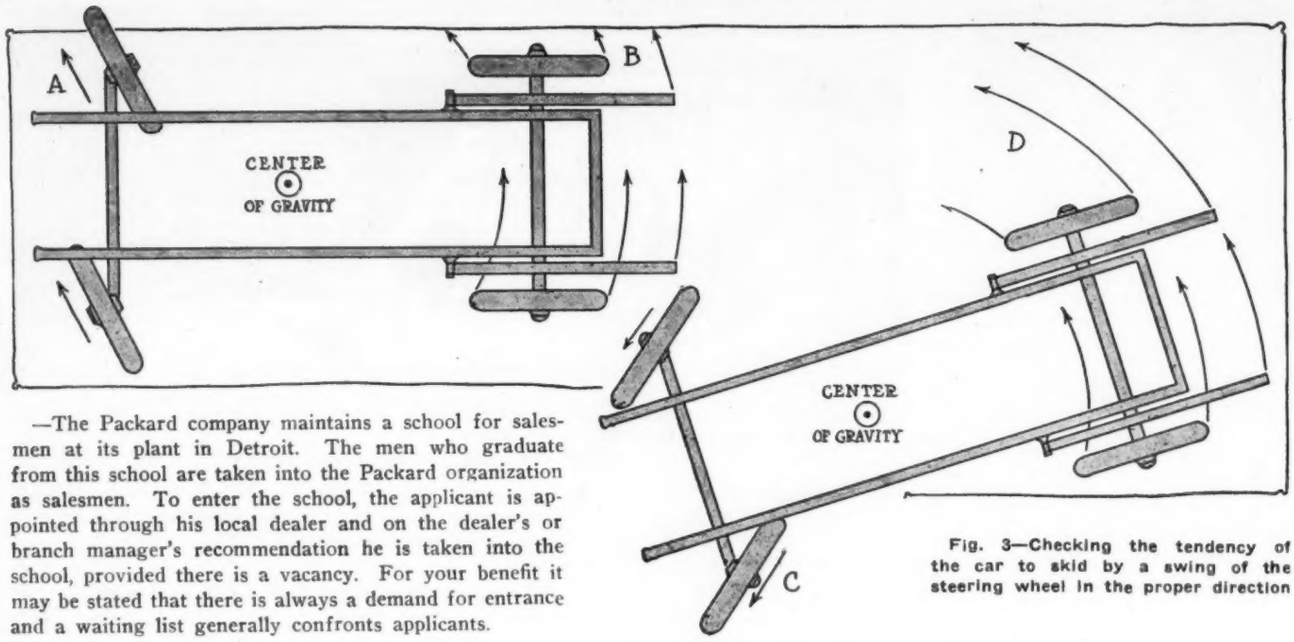


Fig. 3—Checking the tendency of the car to skid by a swing of the steering wheel in the proper direction

—The Packard company maintains a school for salesmen at its plant in Detroit. The men who graduate from this school are taken into the Packard organization as salesmen. To enter the school, the applicant is appointed through his local dealer and on the dealer's or branch manager's recommendation he is taken into the school, provided there is a vacancy. For your benefit it may be stated that there is always a demand for entrance and a waiting list generally confronts applicants.

Preventing a Dangerous Skid by a Twist of the Wheel

EDITOR THE AUTOMOBILE:—There is nothing so fraught with danger to the automobilist as the skid. At this time of year when both the city streets and the country roads are often covered with a coating of slime which allows the wheels to get but a light grip on the surface of the road, the dangers under certain circumstances cannot be over-estimated. In view of this fact every one that drives should know the simple method of checking a skid by a simple manipulation of the steering wheel. As shown in Fig. 3, the car skids when there is a momentum tending to turn it about the center of gravity. When the forces about the center of gravity are balanced the car cannot skid. If the steering wheel is immediately turned in the direction of the skid, the skidding will cease because this will cause a tendency to rotate in the opposite direction. Following the diagrams, with the steering wheels turned as at A, the wheels B and A tend to swing in opposite directions and neutralize each other. When turned the other way C only tends to increase the skidding effect at D. After a little practice this swing of the steering wheel becomes instinctive.

New York City. L. BOURGETTE.

Can Make Money Running Car

Editor THE AUTOMOBILE:—According to a few advertisements in your paper one can run a car free of expense, as follows:

1—Ajax Tires, "5,000 miles."
2—Fit with Interlocks, "double mileage."
3—Repair with Tire-Doh, "double mileage."
4—Paint with Tirenew "Add 30%" Total; 26,000 miles.
5—Carry Gilmer pliers, "Pays for a set of tires every 4,000 miles."
Result, four surplus sets every 26,000 miles.

6—Feps carbureter saves	50%
7—Mondex Helix saves	40%
8—Stewart Gas Saver saves	40%
Total	130%

Thereby making on an average 3 gallons per 100 miles run. Why?

Philadelphia, Pa. G. W. B.

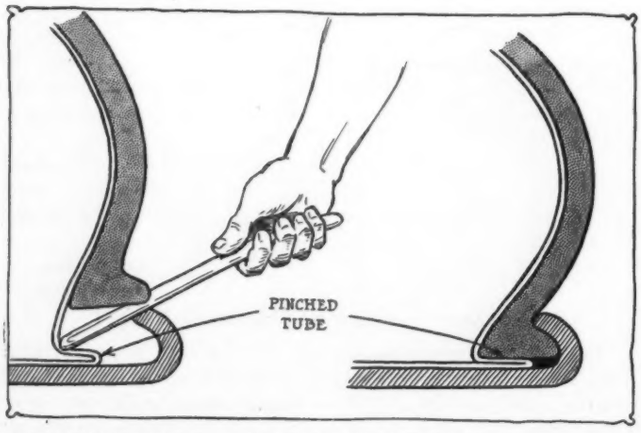


Fig. 4—How tubes are pinched by the iron and by the tire bead

Latent Heat of Vaporization

Editor THE AUTOMOBILE: What are the variations in the specific heat of gasoline and its effects in its vaporization? What is the latent heat of vaporization of gasoline? SUBSCRIBER.

New York City.

—The specific heat or amount of heat measured in British thermal units necessary to raise 1 pound of gasoline 1 degree Fahr. is .500. Hence a drop of 1 degree Fahr. in the temperature of 1 pound of gasoline corresponds to the dissipation of .5 British thermal units. The specific heat of air at constant pressure is .2375; and a drop of 1 degree Fahr. is attended by the dissipation of .2375 British thermal units per pound of air. Taking the mixture proportions as 1:15.39, as above, the heat available per degree Fahr. of drop in the temperature of the mixture is $1 \times .500 + 15.39 \times .2375 = 4.155$ British thermal units.

Since the latent heat of vaporization is very approximately 210.5 British thermal units, it follows that this 210.5 British thermal units must be supplied by the ingredients or by heat from some outside source applied directly to the fuel.

Consider the heat supply in the mixture ingredients themselves. Since the mixture 1 : 15.39 is capable of supplying 4.155 British thermal units per degree Fahr. of drop, it will require a drop of $\frac{210.5}{4.155} = 50.66$ degrees Fahr. in the mixture to completely vaporize the 1 pound of fuel contained therein. The mixture 1: 15.39 cannot exist below 1.5 degrees Fahr., so it will be necessary that both the air and the gasoline have a temperature of at least 1.5 degrees + 50.66 degrees = 52.16 degrees Fahr. before the commencement of vaporization. If the mixture is 1 : 18, it can exist at — 5.8 degrees Fahr., and the initial temperature of the ingredients must be at least 38.3 degrees Fahr.

If the requisite amounts of fuel and air are placed in a vessel insulated from outside heat, the above initial temperature values will hold only when the time allowance for vaporization is unlimited. Compared with the short time in which vaporization must be completed in an automobile engine, the passage of time before vaporization would be completed would be almost infinity. However, there are three methods whereby the rate of vaporization may be accelerated; either the fuel may be introduced in a finely divided form; or the initial temperatures of the mixture may be made higher than the above values; or a combination of both methods may be employed.

In any case, the temperature drop can be no more than 45 degrees Fahr. in any mixture of gasoline and air. Therefore, if an increase in initial temperature is resorted to, the final temperature will be higher than that necessary to support the mixture proportions by just the amount that the initial temperature is raised. Suppose an initial temperature of 100 degrees Fahr. and a drop of 45 degrees Fahr. The resulting final temperature in the mixture will be 55 degrees Fahr.

In consideration of the form in which the fuel is presented to the air in the average carbureter, this final temperature will be higher than 55 degrees Fahr. because the total amount of fuel will not have been vaporized, and the amount of heat necessary to complete the vaporization will remain in the mixture as a temperature value. But suppose the vaporization to have been completed in two cases with the final temperature of 55 degrees Fahr. in one and 1.5 degrees Fahr. in the other. Since the same amount of fuel is present, the volumes per pound of the two mixtures, at the same pressures, may be taken as bearing the same relationship to each other as the volumes per pound of dry air at equal pressures and the two temperatures given. Thus, the ratio of volumes per pound of mixture may be expressed 1 : 88, for the two mixture temperatures of 1.5 degrees and 55 degrees Fahr. respectively. Therefore an engine can aspirate only .88 the amount by weight of 55 degrees Fahr. mixture that can be aspirated of the 1.5 degrees Fahr. mixture. Loss in weight of charge will be greater than here indicated, since the efficiency of the pumping strokes will vary with density of the fluid.

The power of an engine varies as the weight of charge, being greater with a lower mixture temperature.

Making a Cadillac Raceabout

Editor THE AUTOMOBILE:—I have a 1910 Cadillac which I am remodeling into a raceabout. The seats are on the frame, and the steering column lowered, but the car is still too high. Would it be possible to lower the frame a couple of inches by taking two or three leaves from each spring, or would that weaken them to such an extent as to cause them to break?

New York, N. Y. J. B. ALLISON.

—You cannot take out any spring leaves even in consideration of the lighter weight of the body and still have a suspension which will be satisfactory. The best way of going about this job would be to swing the front springs under the front axle making an underslung construction here and then having the rear spring members flattened.

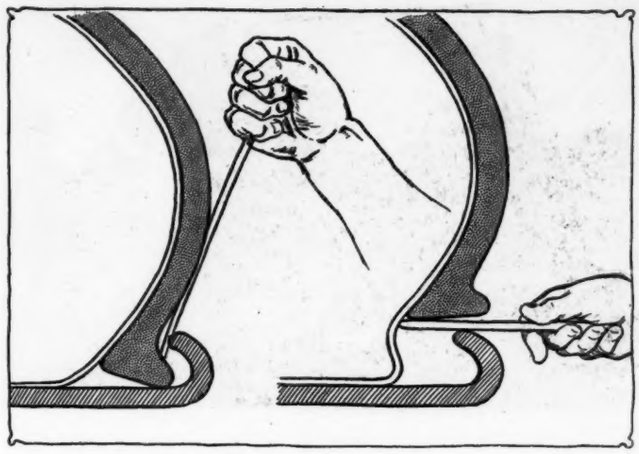


Fig. 5—Removing the tire with a downward movement of the iron

Novel Magneto Couplings for 1913

(*Continued from page* 899)

magneto is machined especially to take the base of the magneto and the entire fitting is so arranged that the drive is aligned permanently, that is, there is but one place to put the magneto and any shifting of this would cause the drive to be out of line. The flanges for the magneto coupling are slipped over a taper in the shaft and are held by a key and a nut over the end of the shaft.

Columbia

The magneto coupling on the Columbia cars is flexible and adjustable. The flexible feature is secured by having the drive transmitted through leather and the adjustable feature by having the connecting bolts pass through slots instead of holes. A study of the sketch will show that the leather disk, which is somewhat smaller in diameter than the shaft flange, is held to the latter by two bolts. These stud bolts are only threaded at the point at which they pass through the metal flange and are not threaded into the leather. The connection of the leather disk to the driving flange is by means of two bolts also, but in this case the bolts pass through slots. By loosening the nuts on these bolts they can be slipped around for a short distance to make minor timing adjustments.

Glide

A novel drive for the magneto is employed on the Glide cars. This drive has both features of being adjustable and flexible. The drive is transmitted through a spring. Unlike the Bosch drive, this is a modified lever spring and not a laminated spring. The adjustable feature is secured by a series of holes through which pass two bolts. By loosening these bolts and slipping the flange around in either direction the adjustments for timing can be made.

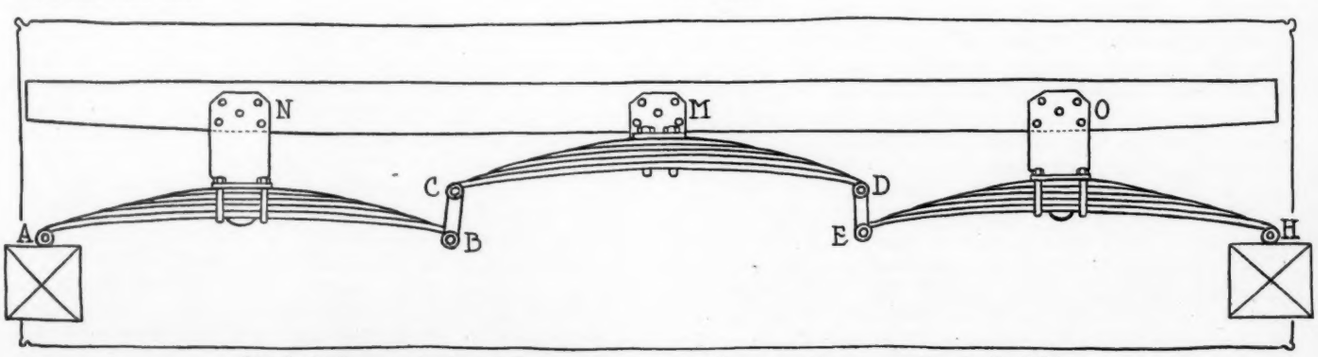


Fig. 6—Spring suspension of E. M. Morley criticized by a reader as wanting in flexibility

Filling special fuel tank in Harroun carbureter test

Test Harroun Carbureter on Kerosene

Road and Track Tests Made by "The Automobile"—New Instrument a Marked Success

By Darwin S. Hatch

INDIANAPOLIS, IND., April 21—Ray Harroun, one-time champion of the Motor Speedway, today completed another 500 miles on the famous oval in a much less spectacular manner than when 2 years ago he was hailed as the winner of the International Sweepstakes; but today's finish of the 200 laps has a meaning manifold greater to the motoring world at large than did the one that crowned him Speed King. It means the completion of a series of accurate tests that show beyond doubt that the cost of motoring can be more than cut in two and that without sacrificing anything in the way of easy starting or clean plugs or anything else that makes the operation of a motor pleasant and efficient. It means that there is at least one carbureter that will handle kerosene.

Harroun has turned from the profession of speed merchant, and for the past 2 years has devoted his energies to the manufacture of carbureters. He makes the carbureter that is stock equipment on the Marmon car.

The new carbureter is almost the same as this except that it is arranged so that practically all the exhaust gas passes around the venturi tubes, that is, the pipe that surrounds the spray nozzle is in the path of the exhaust gas.

The same automobile and carbureter were used throughout the tests. The carbureter was Harroun's new design, 1.25-inch size. It is exhaust-jacketed and the primary air is heated, though the secondary air, which is by far the greater proportion when the motor is running at normal speeds, is not heated. A means is provided for raising and lowering the needle valve by a little lever on the dash. This is not a special feature as it is a part of the older type of Harroun carbureter.

The car was an Overland, model 69, five-passenger touring car, with four-cylinder motor, 4 inches bore and 4.5 inches stroke, cooled by thermo-syphon water circulation, and fitted with U. S. L. electric cranking and lighting system. On the running-board is a small tank which holds 2 gallons of gasoline. This is connected through a foot valve at the dash to the intake manifold and is used to run the motor until the exhaust warms up the low-grade fuel. The operation of starting simply resolves itself to holding in the foot valve for a moment while the electric cranking button is pushed. The average time required to run on gasoline when kerosene is used was about 2.5 seconds; the longest time was 6 seconds. This was in the early morning after the car had stood outdoors all night. The auxiliary gasoline tank simply is a primer, and may be replaced by an acetylene primer. It also may be replaced by an electric heating coil, which would make the outfit start on the low-grade fuels.

A road test under average touring conditions was the first event staged. The course was from Chicago to Indianapolis by way of Logansport and Kokomo. At the beginning of the test the fuel tank was drained of its contents and filled with kerosene at a garage at $0.15 a gallon. This was 44 degrees Baumé Perfection oil, being the kind that is sold the country over at 10 cents retail. Lubricating oil and radiator tanks were filled and about 4 o'clock last Thursday afternoon we started. The party consisted of Ray Harroun, driver; the writer beside him, and Dillwyn M. Bell, president of the Ward-Bell Co., Chicago, as supercargo.

Fitted out with supplies, our driver put his heel on one button, his toe on another for an instant and the motor was running as sweetly on coal oil as though that were its natural food. Starting up in a garage can be depended upon to bring out the smoking capabilities of a motor, but even this did not develop excessive smoking. The smoke could be noticed, but it was not as evident as with the major portion of gasoline-burners.

Two miles north of Highlands, Ind., we struck some heavy sand where the road was being repaired after the late deluge Most of the distance into the town was made on first or second speed, but the motor did not seem overly warm at the end of the stretch.

We made Valparaiso for late dinner and then over sand roads through the swamps to Knox, where we spent the night. The car was left standing out under the trees and when we started in the morning the primer button had to be held for 8 seconds. This was the only time that the engine did not take hold almost instantly.

At Logansport we took on 1 quart of oil after a run of 136 miles; stopped at Kokomo for lunch, and at Westfield for 2 gallons of kerosene. This also was Standard Perfection grade, but cost only 10 cents a gallon. It had a gravity of 43 degrees Beaumé at a temperature of 60 degrees Fahrenheit. Indianapolis, the end of this cross-country kerosene cruise, was reached in the afternoon. After considerable running about town, the fuel, lubricating oil and water tanks were again filled to determine the amount used on the run. The total distance recorded was 224.2 miles and the consumption of kerosene for the run was 17.25 miles per gallon. Complete results of this part of the test are appended.

The second half of the tests were conducted on the Speedway to determine the relative values of four different grades of petroleum fuel products as handled by the new Harroun carbureter. These fuels were Crown gasoline of 60 degrees gravity, the Standard Oil Co.'s new product, Stanolind Motor Spirit, of 62 degrees gravity; Palacine oil, which is the highest grade of kerosene and tested at 49 degrees gravity; and Perfection oil, which is the ordinary kerosene you buy in every country grocery, testing at 40 degrees Beaumé.

These fuels were drawn direct from the storage of the Standard Oil Co. at Indianapolis, tested for gravity at 60 degrees Fahrenheit, and the cans sealed. Then the main fuel tank was disconnected and a special tank attached to the outside of the car, where it could be filled and drained readily. After each test, the special tank was drained and the motor run until the carbureter ran dry before another fuel was put in the tank.

Before tests were commenced the odometer was checked over measured distances on the Speedway and found correct.

In the economy tests, 1 gallon of the fuel was put in the special tank and the car run at a practically constant speed of 25 miles per hour till the fuel was exhausted. The miles thus covered on the Speedway with 1 gallon of each of the four

fuels was recorded as the miles per gallon economy of that fuel. The necessity of a stop during Test No. 1 for a tire change necessitated a similar stop in each of the succeeding economy tests. Had it not been for these stops it is probable that the economy on all of them would have been a shade better. These tests were made with driver and observer, top down and windshield up.

Next the four fuels were tested for their relative values as speed producers. No attempt was made to show the speed possibilities of either the car or the carbureter. No adjustments had been made on either. Speed economy and acceleration tests were all made with the same adjustment of the carbureter, except as it may be controlled from the driver's seat. By tuning up car and carbureter after the tour, it is certain that speed and acceleration showings would have been still better than they were.

Speed tests of the fuels were made by timing the car with a stop-watch over a measured mile and a measured half-mile on the Speedway. Occupants of car on these tests were driver and observer; top and windshield down. Kerosene showed 5 per cent. more speed than Motor Spirit and 12 per cent. more speed than Crown gasoline.

Acceleration tests on the fuels were made by timing with a split-second stop-watch the number of seconds necessary to increase the speed from 10 to 20 miles per hour and from 10 to 30 miles per hour. In this one test alone kerosene conceded first place, Motor Spirit making the best showing and gasoline next best. Results of these tests are given in the accompanying tables.

In general the deductions to be drawn from this series of tests are that:

1. As handled by Harroun's new carbureter, the low-grade kerosene known as Perfection oil and selling practically everywhere at one-half the cost of gasoline gives better mileage gallon for gallon than any of the other fuels tested; gives more than twice as much mileage dollar for dollar than gasoline; gives more speed than any of the other fuels; acceleration almost as good; carbonization, nil; smoking negligible; general action the same as gasoline except for the necessity of preheating the fuel.
2. The lower the gravity of the common petroleum distillates, the better economy in miles per gallon and cents per mile—excepting Motor Spirit, which seems to fall between gasoline and Palecine oil in these considerations.

Speed Tests Over Measured Mile and One-half Mile

Fuel	Gravity	Miles per hour ½	Miles per hour 1 Mi.	Ave. M.P.H
Kerosene	43	47.3	51.1	49.2
Motor Spirit	62	46.5	....	46.5
Gasoline	60	43.0	43.4	43.2

Acceleration Tests

Gr.	Fuel	Seconds to Accelerate from Miles Per Hour 10 to 20	10 to 30	20 to 30
43	Kerosene	8.2	16.4	8.2
60	Gasoline	7.3	16.1	8.8
62	Motor Spirit	7.3	16.0	8.7

Economy Tests of Four Fuels

Test No.	Fuel Used	Gravity Degrees Beaumé	Miles per Gal.	Price per Gal.	Ton-Miles per Gal.	Cost per Ton-Mile
1	Kerosene	43	22.2	$0.08	26.64	$0.0039
2	Kerosene	49	21.6	.10	25.92	.0038
3	Motor Sp.	62	20.4	.13	24.48	.0054
4	Gasoline	60	20.0	.16	24.0	.0067

Note—Prices based on quotations on tank wagon lots at Indianapolis April 19. Speed constant at 25 miles per hour. One stop in each test.

Kerosene Vaporizer Cuts Down Fuel Expense

THE G. C. vaporizer is a device just introduced into America for the use of the heavier products of petroleum. The heat of the exhaust is used to vaporize the heavy fuel and the latter is fed to the motor in the form of a gas. The motor is started on gasoline and runs with it until the vaporizer has become warm enough to do its work.

The vaporizer is a unit with the muffler or silencer and works in conjunction with it. The fuel passes through a regulation float feed arrangement on the way from the tank to the vaporizer. It is fed through a perforated pipe and passes over a bed of gray iron slugs, which act as a heat retainer and which absorb the heat from the exhaust. The resulting gas is sucked through a pipe by the motor and is mixed with air through a dash-pot arrangement, thus forming an explosive mixture.

The action of the entire system is exactly parallel to the action of a suction gas producer. The exhaust enters the muffler V and passes through the center into a cylindrical opening E. Surrounding this central pipe is a layer of the gray iron slugs D. Above the central passage and through the slugs passes a pipe F which carries the fuel supply. This pipe is perforated and permits the kerosene to seep through the hot iron. The heat contained in the slugs is sufficient to vaporize the kerosene and the result is that a gas is formed which fills the passage above the iron. Through the bottom of the muffler-vaporizer there is an air passage B, as shown in the diagram. Connecting the passage containing gas with the motor is the suction pipe.

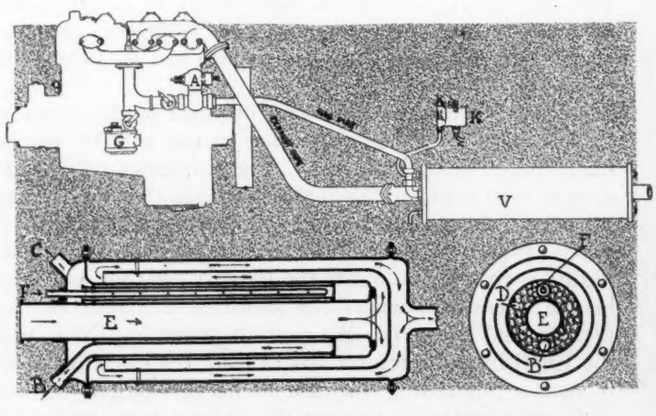
The suction of the motor on this pipe draws the air through the hot kerosene vapor which mixes with it and the mixture passes on to the motor, drawn there by suction. The gas passes through a mixing valve A of dashpot pattern on its way to the motor and is there further mixed with air. The amount of gas and air drawn in is regulated by the demands of the motor. When the motor speeds up it naturally exerts more suction and also opens the dashpot further, thus getting a heavier charge into the cylinders.

To fully comprehend the action of the vaporizer the sectional view may be noted. The center is the exhaust passage into which the exhaust gases of the motor flow on leaving the cylinders of the motor. Surrounding this passage is a layer of cast-iron slugs through the top of which passes the fuel intake pipe and through the bottom passes the air intake. Outside of this is the baffled exhaust which is silenced by gradually reducing its pressure through expansion.

The car does not have to be changed in any of its salient features to accommodate the G. C. outfit. A small gasoline tank is added and the former gasoline tank used for kerosene or heavier fuel. The hand throttle is used to govern the gasoline flow for starting purposes and the accelerator pedal controls the flow of kerosene vapor to the motor. When using the kerosene system, the gasoline system is so arranged that a closed throttle absolutely closes the throttle valve instead of leaving a partial opening.

Owing to the construction of the vaporizer it is claimed that it will maintain its temperature for a period approximating 2 hours on the average. This means that within 2 hours after the stop was made the motor would start on the kerosene instead of going through the process of restarting with gasoline. The

(*Continued on page* 911)



Diagrammatic and sectional view of G. C. kerosene vaporizer

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The Field of the Cyclecar

THE British Isles, parts of Germany and other European countries are motor-mad over the new cyclecar which made its advent a year ago. This car, which has been responsible for the phrase, "new motoring" which is now becoming general abroad, is infusing not only a new life into the motorists themselves but into many in the manufacturing end. It is infusing new life because it appeals to a class of buyers who, up to the present, have been overlooked by the European makers, namely, the man of moderate means who has $800 for a car, but not enough money to maintain the present-day machine with its high consumption of gasoline, which sells at 43 cents a gallon, and its heavy tire wear.

The new cyclecar comes as a bonanza to this class of buyers, who are more concerned in the cost of annual maintenance than first cost. The European owner has always been a stickler on maintenance in that he has had his prescribed income to live on, outside of which he must not go under danger of financial embarrassment. Naturally, such a buyer wants the lightest car that will meet his requirements; wants the speediest car that he can receive, and wants the cheapest to maintain. Now that the English manufacturer has at least realized that there is such a purchasing clientele in Europe he has set out with extra endeavor to meet the requirement but to-day the demand is so great that many of the factories sold out their entire 1913 output during the Olympia show. Premiums are actually being offered for not a few of the best cyclecars.

While the movement had its inception in England, it soon spread to Europe. Germany took it up with avidity, and one manufacturer after recently announcing his new cyclecar through the European trade press, had his entire output contracted for on the first mail after the date of publication.

The exact status of the cyclecar has been largely dictated by the buying public. It wants a two-passenger car, with a space in the rear of the seat on which packages can be carried if necessary. A small motor is desired, the popular design being a four-cylinder block type, with a gearbox a unit with it. Cylinder dimensions rarely exceed 2.5-inch bore, and 3.5-inch stroke, so that 25 to 30 miles per gallon can be obtained in regular use and speed possibilities of 40 to 50 miles also within reach. The wheelbase averages 86 to 90 inches, tires are generally 28 inches and carried on light bicycle-type wire wheels.

All of these cyclecars are four-wheel designs. There is no demand for a three-wheeler. The farmer and market gardener, who are to-day buying these cyclecars in large quantities, want a real miniature car. It must have four wheels; it must have a steering wheel, and the body must be along standard lines. The three-wheeler is not meeting with success, although at one time it was looked upon with favor.

The side car attachment for motor-cycles is not considered because the buyer objects to its general arrangement.

The present construction of cyclecars favors a three-speed selective-type gearbox with shaft drive to a bevel-driven rear axle. Once again must be noted the desire for a real miniature car. Belt transmission was advanced by a few makers as a satisfactory system for a cheap car of this nature, but it has not met with ready response so that few manufacturers are even considering it to-day. Friction drive, which has been taken up by several French concerns, was looked upon as a coming type of cyclecar, but it, too, has failed to meet with acceptance by the buying public. Again, what is needed is the smallest, lightest, most economical, speediest, miniature car that can be marketed at approximately $900.

This cyclecar movement offers a fruitful field for the American maker who considers the export field. At present there are several European representatives traveling through America in search of agencies for cyclecars and the first inquiry with all of them is, Why has not the American builder taken up the cyclecar movement?

While America occupies a unique place in the cheap-car field, there is still much room for the cyclecar movement, which is bound to come, and which when it does come will serve as a feeder to the present low-priced car industry. Cyclecars will have to be produced in large quantities in order to be sold at a sufficiently low price to compete against regular cars of American build, and should the price of fuel increase in America, buyers will begin to give more consideration to the cost of maintenance, and consequently will not object to a fairly high original investment, providing they are assured of good fuel economy and low mechanical maintenance.

Big Plans for Joint S.A.E.-I.A.E. Sessions

NEW YORK CITY, April 21—The Society of Automobile Engineers has announced the program which will be carried out by way of entertaining for the visiting automobile engineers from England who will be returning the visit of the American Society made to Europe nearly 2 years ago, by spending 3 weeks with the American industry in and connected with the annual midsummer session of the S. A. E.

The Englishmen, of whom twenty-five are expected, will arrive in this city Monday, May 26, and the round of visiting factories, entertainment, etc., will continue until Saturday, June 14. During these 3 weeks a circuit will be made of the more important centers of the automobile industry, a day will be spent watching the 500-mile race on the Indianapolis Speedway and a week will be consumed in Detroit and on Steamer Detroit III, which will be the scene of the midsummer sessions of the Society. This will be followed by a circuit through Cleveland, Buffalo, Providence, New Haven and Hartford.

The itinerary among the industrial centers will begin at Pittsburgh, Wednesday, May 28, and on the following day, Thursday, May 29, the Carnegie Homestead Steel Works will be visited and also an inspection made of the works of the National Tube Co. at McKeesport, Pa.

The engineers will arrive at Indianapolis, Friday morning May 30 to view the 500-mile race.

On the following Saturday the Wheeler & Schebler plant will be visited before noon and also the Prest-O-Lite factory. The afternoon will be spent in entertaining.

The party will leave Indianapolis for Detroit at 9 p. m., and will arrive in Detroit Sunday morning, June 1.

On Monday morning, June 2, activities will begin, the forenoon being spent in a visit to the Ford plant and the afternoon at the Cadillac. There will be a party at the Temple theater in the evening.

Tuesday, June 3, will begin with a forenoon visit at the Packard plant followed by a luncheon at the factory and in the afternoon a visit to the Timken-Detroit Axle Co. In the evening there will be a banquet at Hotel Pontchartrain.

Wednesday, June 4, the Hudson Motor Car Co., and the Continental Motor Mfg. Co. will be visited in the forenoon. Luncheon will be had at the Chalmers plant and at 3 p. m. the party will embark on City of Detroit III for the trip to Sault Ste. Marie and return. Professional sessions will be held on board.

Professional Sessions on Boat

The boat will arrive at the Soo Thursday afternoon June 5, and will leave on the return trip at 6 p. m. the same day. There will be professional sessions on board.

Friday, June 6, will be spent in professional sessions, the boat arriving at Mackinac Island at 2:30 p. m. It will remain at the island until 7 in the evening when the return trip to Detroit will begin.

Saturday, June 7, will be occupied by professional sessions until the arrival in Detroit at 3 p. m. A stop will be made until 10 p. m., when the engineers will start by D. & C. steamer for Cleveland, O.

Sunday, June 8, will be spent at Cleveland, the arrival being at 7 a. m. Headquarters will be at Hotel Stattler and the day occupied in motor car drives around the city and to nearby country clubs.

Monday, June 9, will be taken up with visits to the Peerless, White and Winton plants in the forenoon. For those who desire arrangements will be made to visit one of the large Akron tire factories which is 1 hour distant from Cleveland by electric car. At 8 p. m. the party will leave for Buffalo by C. & D. steamer.

Tuesday, June 10, on arrival at Buffalo at 7 a. m., breakfast will be served on the boat. The Pierce-Arrow Motor Car Co. will provide the entertainment for the entire day including a trip to Niagara Falls to see the newest and largest hydraulic electric power plants.

This brings to an end the regular program and those of the foreign contingent desiring to sail on the Mauretania, leaving New York at 1 a. m. Wednesday, June 11, will have an opportunity of doing so but will be required to leave Buffalo at 1 p. m. Tuesday, eliminating the trip to Niagara Falls. An alternative trip through New England is provided.

Kerosene Vaporizer Cuts Fuel Expense

(*Continued from page* 909)

length of time that this could be done would depend on the temperature of the atmosphere. With average conditions the above time would be about correct.

Since the kerosene is vaporized completely before entering the cylinder of the motor it is stated that there is no tendency to form carbon. It is also stated that with this device worked on a 3.16 by 5.12-inch motor, the fuel consumption with a touring body figured 25 miles to the gallon. As there are no comparative figures for this same motor with gasoline these figures are only used to show that a good economy can be expected.

The passage of the kerosene vapor, mixed with ordinary air is at a very low speed—about 10 inches per second—and at a very high temperature of from 550 to 750 degrees Fahrenheit. A complete distillation of the kerosene in contact with the air is thus effected, producing a very light gas, which mixed with atmospheric air, gives a very homogeneous explosive mixture. The mixture thus obtained at the comparatively low temperature of about 122 degrees Fahrenheit, owing to the introduction of outside air, is drawn into the cylinders, compressed and burnt in the ordinary way. The horizontal perforated pipe has a large number of holes .145 inch in diameter, and the liquid is thus distributed by gravity to the hot metal parts, in the chamber in the form of about twenty-five small drops at a time.

The G. C. Vaporizer Co. of America has recently been incorporated and has established itself at 1790 Broadway, New York City. Stephen C. Wolcott is president of the concern, F. T. Blakeman secretary and treasurer and Arthur Waterman, formerly of the Hartford suspension company, general manager. This company has secured the American rights to the G. C. patents and will shortly run official tests through the Automobile Club of America laboratory and road tests under the sanction of the A. A. A.

REPORT

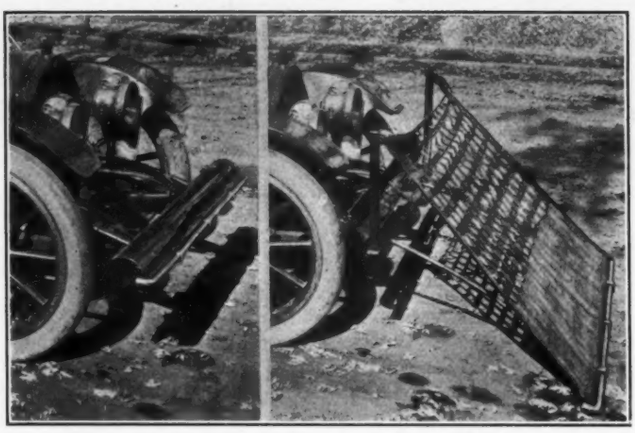
LONDON, ENG., June 3, 1912.

The G. C. Vaporizer, Limited—I have concluded a comparative test between gasoline and kerosene oil, on a 30 h.p. Aster engine, the engine while running on gasoline being under ordinary conditions, and fitted with a G.C. Vaporizer while running on kerosene oil, with the following results:

1. The full load consumption in gallons was the same with kerosene as with gasoline, and rather less at partial loads. The improved running at light loads was due to the more perfect carburetion with the G. C. apparatus as compared with an ordinary high-class gasoline carbureter.
2. Owing to improved carburetion the heat loss to the cylinder walls is less than in the case of a gasoline carbureter and consequently the engine runs cooler.
3. For the same reason the flexibility and acceleration of the engine are increased.
4. There is no apparent carbon or greasy deposit in the engine as a result of using kerosene in the G. C. apparatus.

I have also run a 28 h.p. Straker-Squire lorry, weighing 3 tons 12 cwt., to Brighton and back, fitted with a G. C. Vaporizer using kerosene, with the same mileage per gallon of kerosene as can be obtained for a gallon of gasoline in the ordinary gasoline carbureter. The lorry managed 95 per cent. of the road in top speed and only 5 per cent. in the second gear, proving that full power can be obtained from the engine.

The results of the above tests are clearly of such a satisfactory character that in my opinion there are very great advantages to be derived from the use of the vaporizer, the cost for fuel being halved; it is easily fitted, has no moving parts to wear out, and requires practically no attention.—ROBERT W. A. BREWER.



Figs. 1 and 2—Views of the National automatic bumper-fender in open and closed positions. It is brought into scooping action by means of a lever on the dash or through interconnection with the emergency brakes

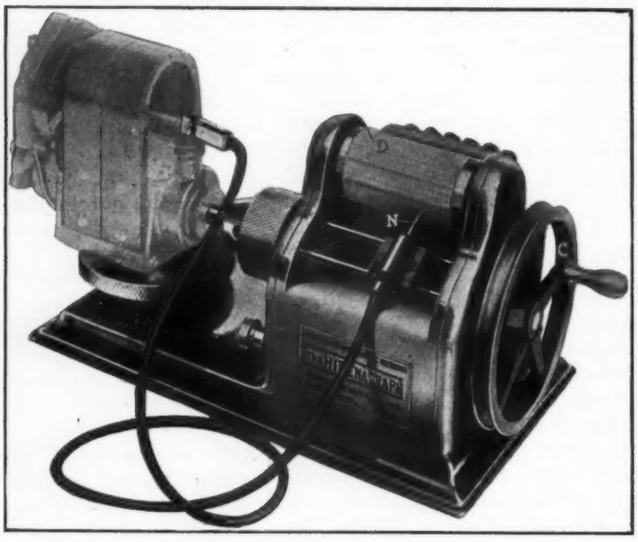
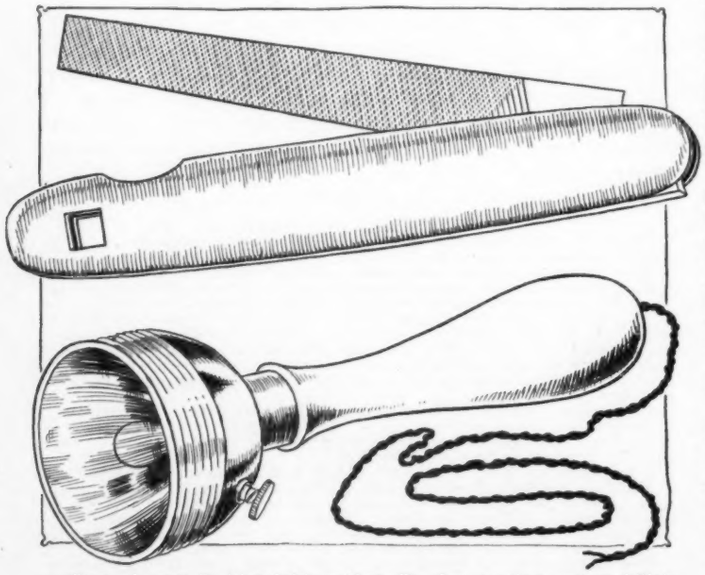


Fig. 3—The Hitenagraph is an instrument by which the timing of the sparks produced by a magneto can be accurately recorded by electrical action on chemically prepared paper



Figs. 4 and 5—Liveright pocket file for touring automobilists and Niagara trouble hunting lamp, in which the button switch is conveniently placed on the handle

NATIONAL Bumper-Fender.—What might be termed a scooping bumper is being manufactured by the National Automobile Fender Co., Omaha, Neb., the device being shown in Figs. 1 and 2. Ordinarily the bumper resembles the common steel-tube type, but Fig. 2 indicates the fallacy of this appearance, for when a lever on the dashboard is moved or the emergency brake is thrown on—either construction may be used—the seemingly normal bumper assumes the exterior depicted in the second illustration and is ready to scoop up whatever is in the way of the car, much on the principle of the old street-car fender.

The Hitenagraph.—An instrument that should prove of considerable value in the testing of magnetos is announced by Francis R. Hoyt, of Cleveland, Ohio. This recording device has for its principal purpose the determination of the synchronism, or lack of it, in the timing of the sparks produced by any magneto placed under test. Fig. 3 shows the general appearance of the instrument. The magneto is placed on the left in direct connection with a horizontal shaft carrying a handwheel, C. Above the drum, D, is geared to the shaft with a two-to-one ratio and carries a strip of sensitized record paper. A needle, N, mounted on guides and automatically carried along in close proximity to the sensitized surface by means of a traveling screw, is placed in electrical connection with the high tension terminal of the magneto as shown. The passage of a spark produces a clearly defined mark on the chemically prepared paper. The relative size of this mark incidentally affords some indication of the intensity of the spark. It is by noting the positions of these impressions that the spark timing is ascertained. A little consideration will show that since the recording drum is rotating at double the speed of the magneto, and further, that the magneto produces two sparks per revolution, the drum turns exactly a complete revolution between each spark. And therefore if the needle were fixed and the magneto accurate the recorded impressions would always be made at the same point on the paper. By causing the needle to move over the surface, however, a line of dots is produced, and according as to whether the line is strictly straight so is the magneto sparking accurately. If the dots alternate zig-zag fashion, the sparks are not occurring at 180 degrees apart, and the exact amount of error is correctly shown by the distance between the marks measured along the diameter. The paper is marked with horizontal lines representing degrees so that this measurement can be easily read. The makers state that with this instrument it is possible to test more than twenty magnetos an hour.

Liveright Pocket File.—Liveright Bros., Philadelphia, Pa., have designed a small pocket file, Fig. 4, which is made of a file steel blade and a nickel-plated casing. The blade is a fine-cross cut and of hard steel, therefore applicable to all sorts of work where care is a requirement and intricacy one of the conditions. The nickel-plated casing is cut with a square hole through it, so that it may be attached to a chain or key ring, making the instrument very handy, especially for touring motorists.

Niagara Trouble Lamp.—In Fig. 5 is shown a new trouble-hunting light made by the Niagara Searchlight Co., Niagara Falls, N. Y. This outfit consists of a dry cell, 6 by 3.5 by 2 inches, the poles of which are connected by insulated wiring to a trouble lamp. The circuit is closed by pressing a button, as a result of which the filament of the bulb is set aglow, the insulator handle permitting of applying the lamp at any point about the car, as the length of the wire is sufficient for this purpose. The device is neatly finished.

Vaile-Kimes Tire Pump.—An air pump designed to pump up the tires of accessory-stores' customers has been constructed by the Vaile-Kimes Co., Dayton, O. Fig. 6 shows the device, which is 28 inches long, 10 inches wide and 16 inches high, and is capable of pumping up a 40-inch tire

from flatness to 75 pounds in 4 or 5 minutes, according to the maker. The combination of a motor with a small pump permits of rapid operation of the latter, so that the necessary tire pressure is easily attained; and in this point lies the advantage of this little machine over a heavy compressor serving a storage tank and working at all times to keep it full.

LBA Storage Batteries.—New methods of construction are incorporated in the latest LBA batteries produced by the Willard Storage Battery Co., Cleveland, Ohio. Instead of cell connectors of the ordinary lead pattern with sealed covers to the cells, a new design of bolted connector and cover sealed with pure, soft rubber gaskets is used. A big advance in accessibility is thus secured, and the resealing and reburning of connectors, etc., is obviated. In Fig. 7 a partial section of one of these new cells is shown, together with larger views of the special gasket, A, and cover, B, C, is the latest type of cell connector. The jars are built with heavy walls to insure against breakage. They are supplied with two depths of mud spaces, M, that shown in the illustration being the standard. In the other this space is twice as deep. Special vent plugs, designed to condense the gas produced in charging by breaking the bubbles before they escape, are used. Throughout all the LBA batteries the individual cell unit principle is employed, so that any one cell can be inspected or repaired without disturbing the others. As all connections between cells are above the top cover, the possibility of local action between cells is reduced to a minimum. There are no exposed parts subject to corrosion.

Essex Blow-out Sleeve.—The Essex Rubber Co., Inc., 258 Broadway, New York City, is the manufacturer of the Essex Double Strength Blow-out Patch or Inner Sleeve. It consists of several layers of high-grade cotton duck, securely vulcanized together by means of pure rubber and formed with two flaps which go between the bead of the casing and the rim to insure the patch's staying in place after being installed. This patch is shown in Fig. 8.

Hercules Car Lock.—A new lock for preventing the theft of the car has been placed on the market by the Hercules Lock Co., 1559 East 85th street, Cleveland, O. The lock operates on a principle similar to the cock of a gun, controlled by a Yale lock-and-key instead of a trigger. The lock, Fig. 9, is a casing containing the lock mechanism and sliding on the gearshift to which it is screwed. The casing is formed with two arms, A, reaching down into the quadrant cut. When the lever is in neutral, the lock casing may be pressed down by hand or foot until the arms enter the quadrant, when the lock snaps and the lever automatically locked in its place. It is only by applying the Yale key to the lock that the engagement may be released, whereupon the casing returns by spring pressure to its original position, leaving the gearshift lever free to move. The lock is guaranteed to be not removable without breaking it or the gearshift mechanism.

Ten Eyck Automatic Air Pump.—This device, shown in Fig. 10, and designed for use in connection with air starters and tire inflation, attaches to the side member of the chassis alongside the pump shaft, to which it is geared. The special feature of the pump is an automatically controlled gear meshing and clutching device which is operated by the pressure of air in the storage tank or tire being charged. This clutch and meshing gear is actuated by a small cylinder, C, incorporated in the crankcase. When in use the back pressure from the air receiver slides the pump gear into mesh with the driving gear, after which the clutch is engaged. Disconnecting the pump from the air tank or tire allows the pressure to escape from the automatic cylinder, withdrawing the gears by means of a return spring contained in the cylinder. It will be noted that all these operations are automatic. The danger of clashing gears when meshing is avoided by the combination of clutch with sliding gear wheels, the teeth being partly in mesh before the clutch is allowed to come into action. When used in connection with a storage tank for engine cranking purposes, a special air valve is inserted in the pipe between the pump and the tank, and is usually mounted on the dash. In recharging the tank this valve is opened, allowing the air pressure to enter the automatic cylinder of the pump and slide the gear into mesh. When the gauge registers sufficient pressure the valve is closed, thereby retaining the pressure in the tank, but permitting the air in the automatic cylinder to escape through a vent in the valve provided for that purpose. The return spring in the cylinder then forces the gears out of mesh into the idle position. This pump is being placed on the market by the Auburn Auto Pump Co., Boston, Mass., in two models, one as described, and the other not furnished with the gear meshing device, but otherwise identical.

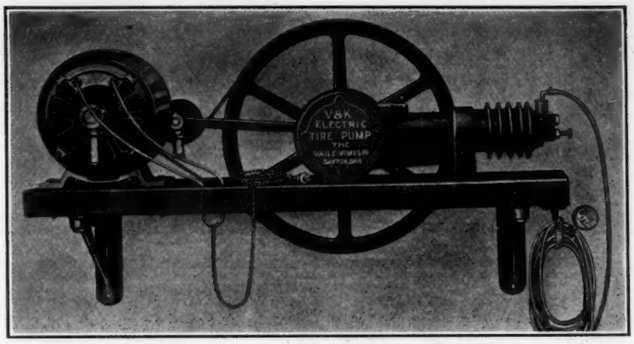


Fig. 6—Electrically driven air pump of Valles-Kalmes Co. for tire charging in garages and accessory stores

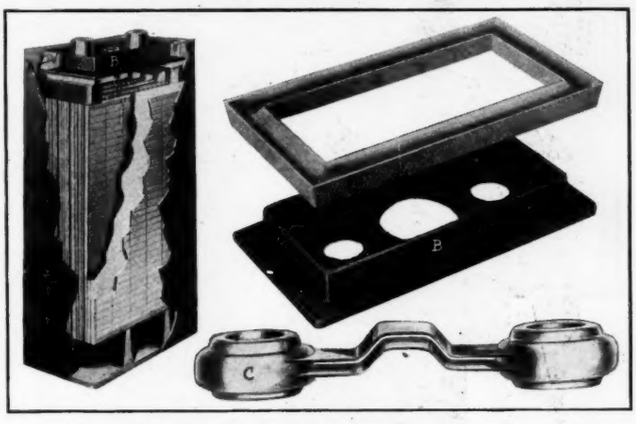


Fig. 7—Latest LBA battery with new form of top sealed by use of rubber gasket. Special cell connector also shown

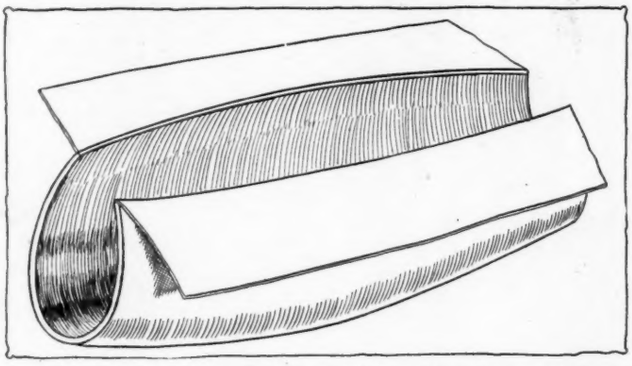
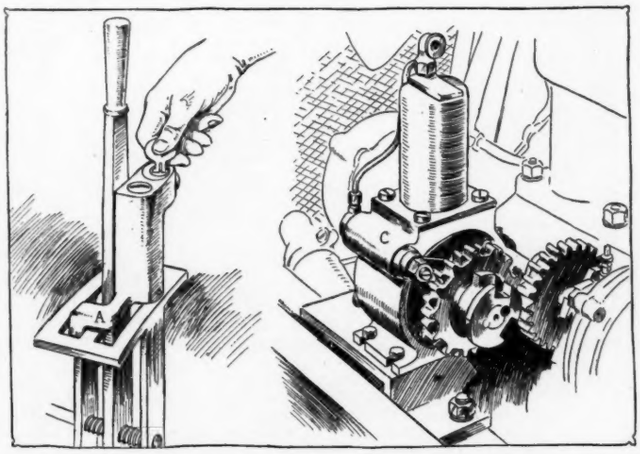
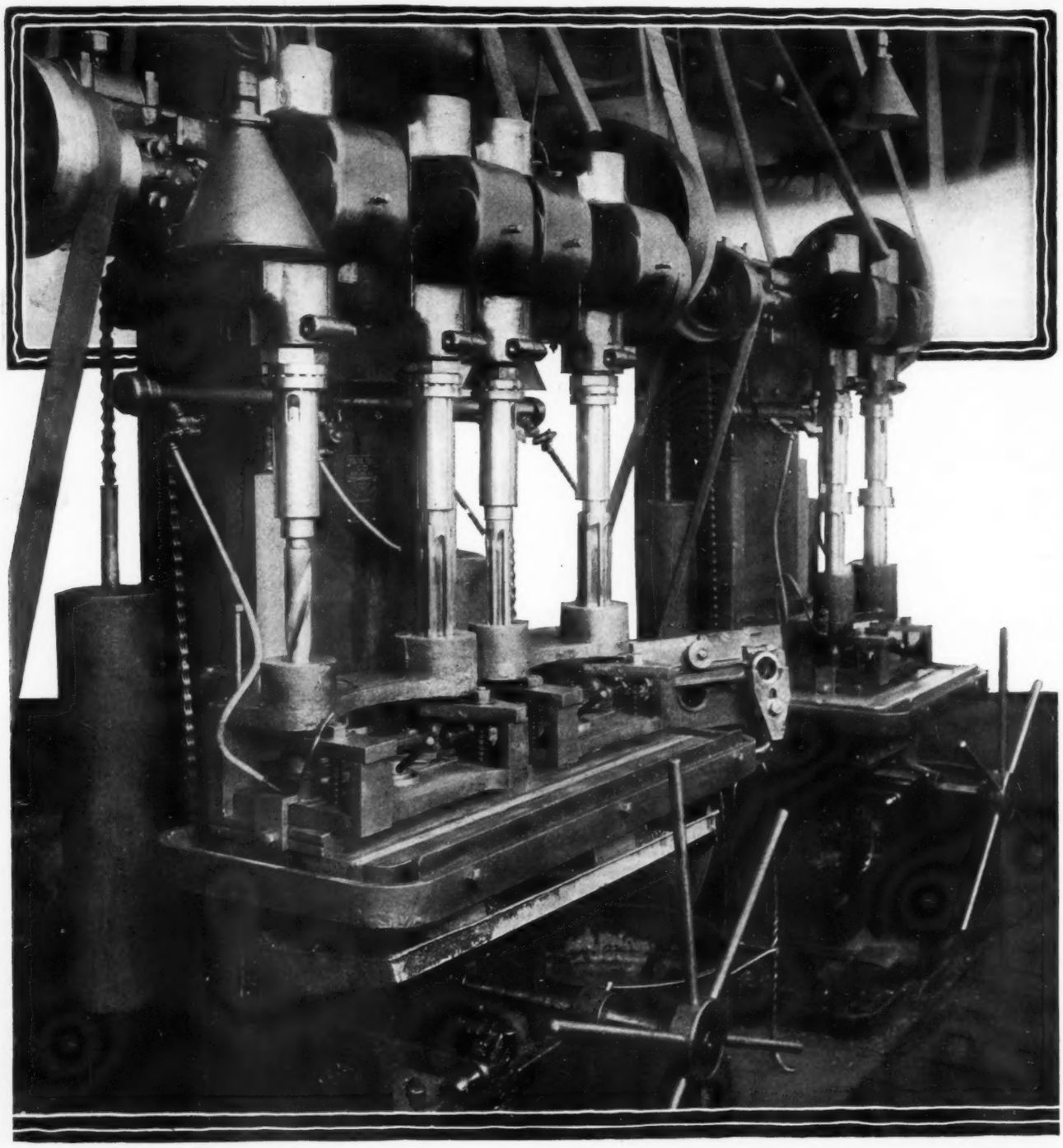


Fig. 8—Essex blow-out sleeve with flaps for fixing in place



Figs. 9 and 10—Hercules car lock on gearshaft lever and Ten Eyck air pump with automatic declutching device

Factory Miscellany



THE above illustration shows a general view of the tools used in machining connecting-rods for the Case 40. The machine in the foreground is a four-spindle Moline drill press. The heavy fixtures having hardened bushings are clamped to the table of machine and the jigs for holding the rods, of which there are four, are located by means of hardened pins and an eccentric pin in a bushing on the base of the jig. The first two spindles drill the wristpin and crankpin holes respectively, and at the same time a second jig with a rod is completing the second operation, which is boring to reaming size.

The machine in the background is a two-spindle machine, having a fixture similar to the first, and whose locating points bring the rod into perfect alignment for the reaming operation. The fixture for holding the rod has a hardened nut with a taper working between two hardened plates. These plates are gibbed to the base, and by means of the nut a universal motion is imparted, thereby centering the rods. All previous operations are located by means of this same device. One man operates both machines loading the extra holder during the operations, thus saving time and increasing efficiency.

WERRA Aluminum Foundry's Addition—The Werra Aluminum Foundry Co., Waukesha, Wis., has leased the Wisconsin Railroad shops and will change same for foundry purposes. The building has a floor space of nearly 35,000 square feet with additional buildings covering in all 55,000 square feet. This company manufactures automobile castings. It employes about 500 men.

Rambler's 13-Hour Shift—A 13-hour factory shift was put on recently by the Thomas B. Jeffery Co., Kenosha, Wis.

South Bend Wheel to Erect—The South Bend Spring Wheel Co., South Bend, Ind., recently organized, is planning to erect a factory building.

Automobile Clothing Factory Moved—The Summer and Auto Clothing Mfg. Co. has moved its factory to the old Alchular factory building, College Point, L. I.

Ryder Planning Addition—The Ryder Motor Co., Poughkeepsie, N. Y., is having plans prepared for the erection of a 90-foot two-story and basement addition to its present plant on Market street to be used for storage purposes.

For Automobile Frame Factory—The Parrish & Bingham Co., manufacturer of automobile frames, Cleveland, O., is having plans drawn for a new factory 900 by 100 feet. It will cost about $100,000.

Panama Rubber Seeks Plant—The Panama Rubber Co., Los Angeles, Cal., is seeking a location for a new plant to engage in the manufacture of automobile tires, and a building will be erected as soon as a site is decided upon.

Independent Tire Starts Operations—The Independent Tire Co., Ltd., Guelph, Ont., started operations recently. This concern manufactures the Independent security tread tire, and the general manager of the factory is H. H. Hastings.

Renault Frères L. I. Factory—At the junction of Jackson, Third and Beebe avenues a plot of 17,500 square feet, Renault Frères, automobile builders, will erect a two-story factory and repair shops. These structures will occupy about 10,000 square feet. On the Jackson avenue end the firm will put up an office building. It is intended to improve the whole site eventually.

Keeton Uses Tent—The Keeton Motor Co., Detroit, Mich., has erected a tent 100 by 100 feet to take care of its present business while its factories are being constructed. Plans to remove the body building, top building and upholstering plants to another factory temporarily are being concluded to still further add to the size of the assembling floors at the factory.

Tire Without Rubber—The Divine Rubber Co., which was incorporated recently in Utica, N. Y., with $250,000 capital stock, is preparing to erect a plant in that city in which to manufacture a new patented automobile tire. Instead of being made of rubber the new tire is built up of layers of fabric woven and compressed. A binder is used to give the tire a permanent shape. It is said to be adaptable to all sorts of wheels and to have been tested for several thousand miles on a 5-ton motor truck without showing appreciable wear.

Chicago Pneumatic Tool's Plant—The directors of the Chicago, Ill., Pneumatic Co. are said to have under consideration plans for building a large plant in Canada, possibly in Windsor, Ont., for the purpose of handling its orders in the Dominion. If the plan is definitely decided upon it will necessitate an expenditure of around $350,000. The company now has a plant in Montreal, but this is only equipped for repair work and its geographical location is not so well adapted to the requirements of a manufacturing plant as the one the board has now under consideration.

Shows, Conventions, Etc.

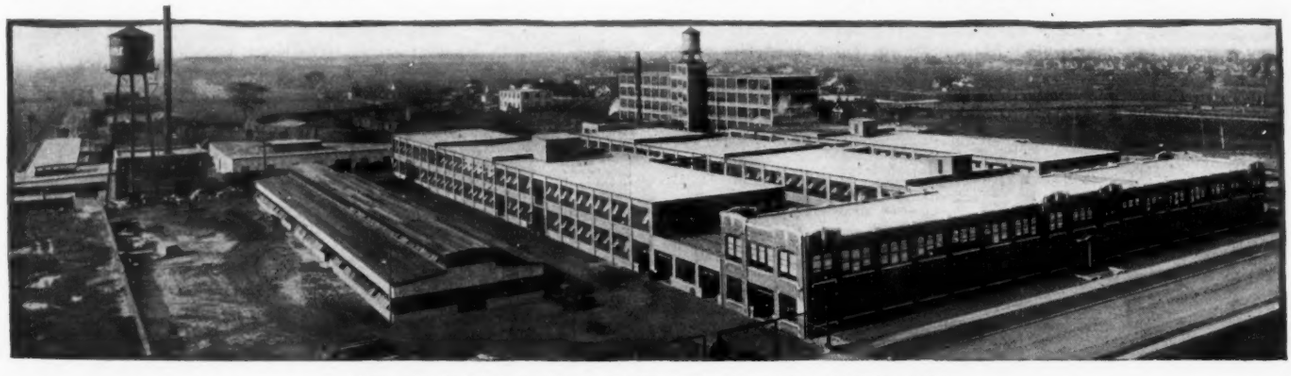
April 21-26.....San Antonio, Tex., Annual Show, San Antonio Motor Car Show Co.
May 20-21.....Boston, Mass., Convention of Electric Vehicle Makers.
June 2-7.....Racine, Wis., "Made in Racine Exposition," J. I. Case Co.'s foundry.
June 5, 6, 7.....Detroit, Mich., Midsummer Meeting of Society of Automobile Engineers.
October .....Paris, France, Automobile Show, Grand Palais; 10 days.
November .....London, Eng., Annual Automobile Exhibition, Olympia.

Race Meets, Runs, Hill Climbs, Etc.

April 23-27.....San Antonio, Tex., Track Meet, San Antonio Automobile Club.
May 2.....New York City, Secret Time Run to New Rochelle, Motor Dealers' Contest Association.
May 5-8.....Washington, D. C., Motor Truck Reliability, *Washington Post.*
May 14.....New York City, Start of 2-Day Hudson and Catskill Scenic Tour.
May 30.....Indianapolis, Ind., 500-Mile Race, Speedway.
June 7.....Philadelphia, Pa., Inter-Club Reliability, Quaker City Motor Club, Automobile Clubs of Delaware County, Philadelphia and Germantown.
June 16, 17, 18.....Columbus, O., Reliability Contest, *Ohio State Journal.*
June 25-28.....Chicago, Ill., Non-Motor-Stop Reliability, Chicago to Boston, Chicago Automobile Club.
July 1.....Indianapolis, Ind., Tour of Indiana Automobile Manufacturers' Association to the Pacific Coast.
July 1-16.....Winnipeg, Man., Motor Plow Competition, Dr. A. W. Bell, Manager.
July 4-5.....Sioux City, S. Dak., Track Meetings, Sioux City Automobile Club and Speedway Association.
July 5-6.....Tacoma, Wash., Road Race, Montemara Festa Automobile Committee.
July 8-16.....Winnipeg, Man., Midsummer Exhibition, A. C. Emmett, Manager.
July 27-28.....Tacoma, Wash., Tacoma Road Races.
Nov. 24.....Savannah, Ga., Vanderbilt Cup Race, Motor Cups Holding Company.
Nov. 27.....Savannah, Ga., Grand Prize Race, Automobile Club of America.

Foreign.

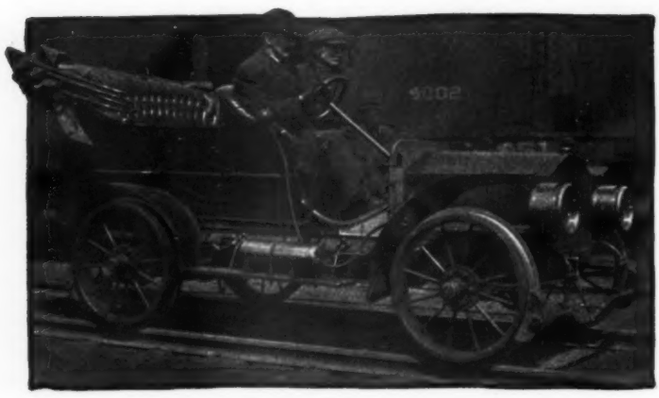
April .....Barcelona, Spain, International Exhibition.
May .....St. Petersburg, Russia, International Automobile Exposition, Building of Michael Maneze, Imperial Automobile Club of Russia.
May 7-10-11.....Paris, France, Sarthe Automobile Meeting and Speed Hill Climbing.
May 11-12.....Palermo, Sicily, Targo-Floria Race.
June 23-28.....London, England, International Road Congress.
July 12.....Amiens, France, Grand Prix Race.
July 13.....Paris, France, French Grand Prix Cyclecar Race.
July 18-26.....London, Eng., Imperial Motor Transport Conference.
Sept. 21.....Boulogne, France, 3-Litre Race.
Sept. 25.....Isle of Man, International Stock Car Race.
October .....Paris, France, Paris Automobile Show.



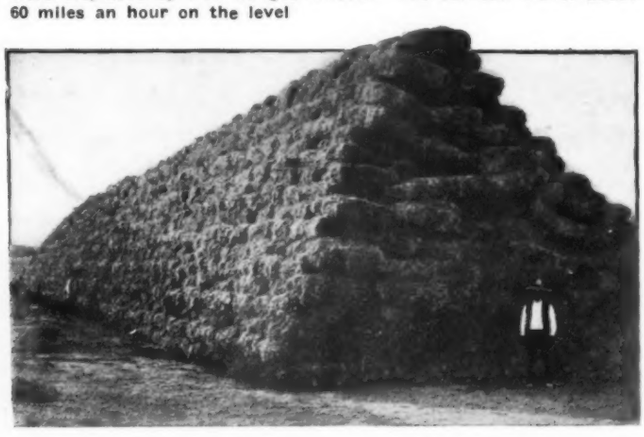
View of the factory of the Hupp Motor Car Co., Detroit, Mich.

The Week in the Industry

Engineer — Dealer — Repairman — Garage



Gasoline railroad inspection car used at Hartford, Conn., by the superintendent of the old Central New England Railroad. An old two-cylinder Pope Hartford car provided the chassis. A four-cylinder E. M. F. motor was installed. The regular wood wheels were displaced by iron flanged wheels. The car can travel about 60 miles an hour on the level



Big stack of guayule rubber shrub. Manufacturers of crude rubber out of the guayule shrub in Torreon and tributary section are preparing to greatly enlarge their operations as soon as the present chaotic condition of political affairs in this part of Mexico is improved. The price of guayule rubber is now double what it was a year ago, and urgent orders have recently been received by several of the independent manufacturers for shipments of all available stock as rapidly as possible. These orders came both from Europe and the United States. It is stated that the cause of the remarkable advance in the price of crude guayule rubber is that it has finally been definitely established that this product can be used instead of Para rubber in the manufacture of automobile tires and electrical equipment

DRAWBACK EXTENDED—The treasury department at Washington, D. C., has made a ruling to the effect that its regulations of November 27, 1907, providing for the allowance of drawback on motor cars manufactured by Brewster & Co., of New York City, with the use of various imported materials and parts, shall be extended to cover the exportation of motor cars manufactured by A. T. Demarest & Co., of New York City, with the use of imported engines, leather, cloth, carpet, plate glass and other materials and parts, in accordance with their sworn statement, filed with the collector of customs at New York.

OPEN NEW GARAGE—J. W. Nelson and Walter Sanford have opened a new automobile garage at Franklin, Neb.

MAGEE SALES MANAGER—M. A. Magee succeeds P. M. Pontius as sales manager of the Motz Tire & Rubber Co., Akron, O.

DOOLITTLE CONTINENTAL ADVERTISING MANAGER—The Continental Motor Mfg. Co., Detroit, Mich., has engaged A. H. Doolittle as advertising manager.

COLES FOR FIRE DEPARTMENT—The Philadelphia, Pa., Fire Dept., has ordered five Cole roadsters for the use of battalion chiefs.

SHADRICK MANAGER—R. H. Shadrick has been made manager for the Viehman Auto Co., Minneapolis, Minn. He has been on the road.

SEATTLE REO MOVES—F. A. Mitchell and Co. has recently moved into new and larger quarters at 1010-12 East Pike street, Seattle, Wash.

OPEN COLUMBUS SUPPLY HOUSE—C. E. Justus and E. E. Parket have opened automobile supply house at 45 North Third street, Columbus, O.

MOTOR IMPORT CO. MOVES—The Motor Import Co., Montreal, Que., will shortly remove to new premises at 971-973 St. Catherine street, West.

MOTZ TIRE AGENCY MOVES—The Philadelphia, Pa., branch of the Motz Tire & Rubber Co., in charge of W. M. Stubbs, has removed to 207 North Broad street.

APPOINTED REPUBLIC TIRE DISTRIBUTORS—Grenier Warrington & Co., Ltd., Montreal, Que., have been appointed Provincial sales agents for the Republic tires.

PHILADELPHIA OAKLAND MOVES—The Philadelphia Pa., branch of the Oakland car, of which E. K. Leech is manager, has removed to 227 North Broad street.

KELLY TIRES IN MONTREAL—The Kelly Tire Co., Montreal, Que., has been formed to act locally as distributors for the Province of Quebec for the Kelly-Springfield tires.

WASHINGTON AUTO SERVICE MOVES—The Washington, D. C., Auto Service Co. has moved from 1610 Fourteenth street to larger quarters at Fourteenth and W streets

PHILADELPHIA FIRM MOVES—The General Motor Car Co., Philadelphia, Pa., has removed to new quarters on Twenty-first street, below Market. It is 60,000 square feet in size.

TREMME JOINS MILLEN—Arthur Tremme, formerly with Chandler and Lyon, Seattle, Wash., has become manager for John Millen and son, at Vancouver and Victoria, B. C.

NEW MOTZ TIRE BRANCH—The Motz Tire and Rubber Co. has opened a branch at 1012 Fourteenth street, N. W., Washington, D. C., with Frank G. Fickling as manager.

TRUCK CLUB'S NEW HEADQUARTERS—The Motor Truck Club, New York City, has leased a new office of the United States Rubber Bldg., Broadway and Fifty-eighth street. Its number is room 1,004.

OPEN COLUMBUS SUPPLY HOUSE—C. E. Justus and E. E. Parker, under the partnership name of Justus and Parker, have opened an automobile supply house at 45 North Third street, Columbus, O.

COLEMAN RESIGNS FROM ATTERBURY—J. R. Coleman has resigned as chief engineer and designer of the Atterbury Motor Car Co., Buffalo, N. Y. It is his present plan to locate in Detroit, Mich.

APPOINTED AUTOMOBILE SUPPLY MANAGER—N. S. Stinchcomb has been appointed manager of the automobile supply department of the Rudolph & West Co., Washington, D. C., in place of E. L. Wilson.

COBURN IN NEW LOCATION—R. F. Coburn, New England district manager of the United Motor, Boston, Mass., Co., announces the removal of that company to its new warehouse, 410 Newbury street.

NEW GARAGE AT ULYSSES—D. C. Chase has purchased the lower floor of the G. A. R. building, Ulysses, Pa., and will soon open as a garage. Automobiles and motor trucks are to be sold and a repair shop will be maintained.

PILGRIM MOTOR TRUCK BRANCH—E. N. McNabb, president of the Pilgrim Motor Truck Co., is in San Francisco, Cal., establishing a branch assembling plant, where the various models of the Piggins truck will be assembled.

MERCHANTS' ASSOCIATION'S NEW QUARTERS—The Merchants' Assn., of New York, has moved into its new headquarters in the Woolworth Bldg., 233 Broadway. The new quarters occupy the greater part of the ninth floor of that building.

FIRE IN PEERLESS BRANCH—A fire broke out in the paint room of the Boston, Mass., branch of the Peerless Motor Car Co., recently, but it was confined to the upper floor where it started, because the building is one of the modern fireproof structures. The loss is estimated at $25,000.

NEW LOCOMOBILE MANAGER—E. R. Travis, until recently assistant manager of the New York City branch of the Locomobile Company, has been transferred to Boston, Mass., as manager to fill the position made vacant by the resignation of K. M. Blake, who has gone with the International Motor Co.

FRONTIER TRANSPORTATION CO.—The Frontier Transportation Co. has been incorporated in Buffalo, N. Y., to operate motor buses over the principal streets of that city. The stock is being marketed along the business interests of Buffalo and the operation of vehicles will be started in the near future.

MAIL COLLECTION BY AUTOMOBILE—The first automobile to be used in the mail collection service of Omaha, Neb., made its initial trip recently. The trip included fifty-four stops, and the 3.8 miles recorded by the speedometer was made in 43 minutes, just over half the time required for the same trip by wagon collection.

PARKWAY FOR STORING AUTOMOBILES—Safety Director Mooney, of Toledo, O., has announced the opening on Monday, April 21, of a parkway for the storing of automobiles, now crowded into public streets and left standing for hours while owners transact business at their offices. The new parkway covers an area of 40,000 square feet and is capable of parking 300 machines.

FISCHER WITH BOSTON MICHIGAN—J. Fischer has become manager of the retail sales department of the Boston, Mass., branch of the Michigan Motor Co.

GARAGE IN RICHLAND CENTER—The Pier Automobile Co., of Richland Center, Wis., has broken ground for its new garage and sales building, to cost about $7,500.

CLARK NEEDS ADDITIONAL EQUIPMENT—The Clark Motor Car Co., Louisville, Ky., will need additional equipment for the repair shop of its new garage at 206 East Broadway.

U. S. TIRE IN WORCESTER—The United States Tire Co., New York City, has opened its new branch in the city of Worcester, Mass., under the management of L. C. Havener.

TRACY PROMOTED—R. B. Tracy has been appointed manager of the Central district by the Michelin Tire Co., of Milltown, N. J. His territory comprises the Chicago, St. Louis and Minneapolis branches.

PURCHASE ECONOMY GARAGE—J. W. Tyler, of North Fond du Lac., Wis., and Walter Kisk, of Wausau, Wis., have formed a partnership and purchased the business of the Economy Garage Co., at Harvard, Ill.

N. Y. DE DION MOVES—Emanuel Lescaris, manager of the De Dion Bouton selling branch, New York city, will move the same on May 1 to larger quarters at 1672 Broadway. The present address is 1649 Broadway.

RED WING ORDERS TRUCK—The city council of Red Wing, Minn., has ordered a $5,600 Seagrave combination chemical and hose motor cart. An expert will instruct the firemen how to drive, and by May 1 the machine is expected to be in operation.

TWIN CITY COMPANY MOVES—The Twin City Motor Car Co., St. Paul, Minn., has moved to a new location, 163 West Sixth street, where it has a service department in charge of Gustav Michaud. A. F. Williams is in charge of the truck department.

LAWRENCE LEAVES NYBERG—Clarence Lawrence, advertising manager of the Nyberg Automobile Wks., Anderson, Ind., has resigned his position to enter the advertising department of the National Cash Register Co., Dayton, O. Victor Washborn succeeds him.

KELLY BOSTON GOODRICH MANAGER—A. J. Kelly, formerly in charge of the B. F. Goodrich Co's. Syracuse, N. Y., depot, has been transferred to the Boston, Mass., branch. Mr. Kelly has been succeeded by Mr. F. G. Mossop, formerly located in the Buffalo, N. Y., branch.

PITCHER COLUMBUS ELECTRIC MANAGER—L. W. Pitcher, 5 years with the electrical department of the Columbus Buggy Co. branch, Minneapolis, Minn., has been made manager. A. E. Archer, for many years the manager, has gone to St. Louis, Mo., where he will sell Ohio electrics.

ST. PAUL ORDERS APPARATUS—For protection of the outlying Midway district the fire commission of St. Paul, Minn., has ordered a Waterous motor-driven and motor-pumping fire engine, manufactured in that city, and a La France combination chemical and hose motor wagon. The two will cost about $12,500.

MINNEAPOLIS BUYS VELIES—The city of Minneapolis, Minn., has bought two Velie 3-ton trucks for use by the city sewer department. The price was $3,165 each. The health department is considering purchase of a Martin tractor to collect garbage from stations and haul to the incineratory. The bid is $3,750.

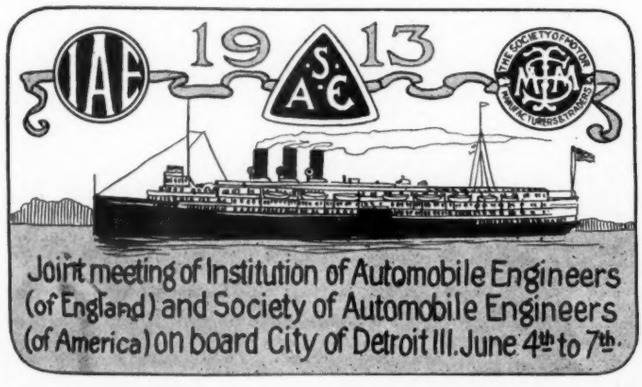
WAGNER AND NICHOLS HANDLE SPARTONS—F. J. Wagner and J. C. Nichols, of New York City, have taken the distributing rights for Sparton horns in the East. They will handle the business from a Broadway headquarters adjoining the General Automobile Supply Co. and the Schebler distributing agency, at 1671 Broadway.

AUTOMOBILE OWNERS IN JOHANNESBURG—A list of the 810 owners of automobiles in the city of Johannesburg, South Africa, and also of the dealers in automobiles and the garages there, has been received from Consul E. N. Gunsaulus, and will be sent to inquirers by the Bureau of Foreign and Domestic Commerce, Washington, D. C.

ARGENTINA'S AUTOMOBILE REPAIR SHOP—It is proposed to start a co-operative mechanical workshop in Mendoza, Argentina, to attend specially to the constant repairs required by the numerous automobiles which traverse the city and outlying districts. The idea is likely to be taken up and will serve as a corrective to the very high charges at present in the repair business.

TRADE BETTER THAN EVER—Automobile dealers in Kansas say there never has been a year when the prospect of business was better than it is this year. Much of the patronage in Kansas is from the prosperous farmers, and when the farmers are making good crops they not only buy machines, but they are disposed to buy second and third cars, and better and better cars.

MONTREAL WANTS MORE TRUCKS—The controllers are asking the City Council, Montreal, Que., to vote money to buy a dozen motor wagons of various makes for the road department. Each will have a capacity of about 6 tons and will move about four times as fast as a team, doing the work of 8 dozen horses. The price is $6,200 to $6,500 each. Three types of machines, four of each make, will be purchased.


IAE
19
S.A.E.
13
THE SOCIETY OF MOTOR MANUFACTURERS & TRADERS
Joint meeting of Institution of Automobile Engineers
(of England) and Society of Automobile Engineers
(of America) on board City of Detroit III. June 4th to 7th.

Poster of the joint meeting of the I. A. E. of England and S. A. E. of America. This is being used at present on all S. A. E. correspondence. On June 4 to 7 these two societies will be on board the steamer City of Detroit III.

Side and front views of the first truck to be manufactured by the Delahunty Dyeing Machine Co., Pittston, Pa. It is of 1.5 tons capacity

NEW OMAHA STUDEBAKER BUILDING—B. J. Scannell, agent for the Studebaker car in Omaha, Neb., recently leased a new building at Twenty-fifth avenue and Farnam avenue. It is said that it will be the largest automobile building in the city. The building will cost $75,000. It is 75x140 feet, four stories high, the first story built of reinforced concrete and the stories above of brick and terra cotta.

NEW BUILDING IN INDIANAPOLIS—Another building has been added to Motor Row in the Capitol avenue boulevard, Indianapolis, Ind. The building has been occupied by Brandt Bros., who have the Lozier agency; the Detroiter Sales Co., which has the Briggs-Detroiter agency and by the McCullough Motor Supply Co. The building is at Vermont street and the boulevard.

MOTOR OMNIBUSES IN PITTSBURGH—Eight large motor trucks, said to be the largest in the world, will be placed in service in Pittsburgh, Pa., on May 1. The Pittsburgh Auto Transit Co. is the purchaser. Each of the vehicles will have a seating capacity of thirty-four passengers. The exterior and the interior strongly resemble street cars. They are of the pay-as-you-enter type and passengers may step from the curb directly into the bus vestibule. A six-cylinder motor is used.

ADDITION TO AUTOMOBILE SALESROOMS—Kahn & Greenberg, Philadelphia, Pa., have purchased properties 107-109 South Twenty-fourth street, 32x50 feet, and will use the sites as an outlet for the garage buildings and motor salesrooms they are building at 2302-12 Chestnut street and 103 South Twenty-third street. When completed the buildings will have a frontage of 174 feet on Chestnut street, and 240 feet on Ionic street. The entire operation will represent an investment of about $300,000.

BUILDING INCREASE IN MILWAUKEE—Broadway, from Mason street to Martin street, which has during the last 5 years assumed pretentious proportions as a motor row in Milwaukee, Wis., will strengthen its position as such with the addition of the Overland-Wisconsin Co., and George W. Browne, Inc., in June. A large garage and sales building will be erected at once at the northeast corner of Broadway and Biddle street by a large investment interest which recently acquired big frontages on Broadway, with an idea of inducing an influx of dealers and garage men in that direction. George W. Browne has taken a 10-year lease on the new building, which will be three stories high, 100x100 feet in size, of reinforced concrete construction.

SEATTLE'S AUTO ROW EXPANDING—Four new buildings involving the expenditure of upwards of $63,000, are to be constructed in the Broadway district, Seattle, Wash. All will be ready for occupancy within the next 90 days. A one-story brick 112x100 feet, will house automobile and supply stores at Broadway and Pike, costing $15,000. Across the street is another building which will rise three stories and cost $15,000. Also L. W. Roe is building a two-story garage and salesroom at Twelfth avenue and East Union, which will represent an outlay of $25,000. Alexander Pierce now has in course of construction at Boylston avenue and Pike, a one-story brick building which will serve as an auto house and will cost upwards of $8,000 and will be completed within 60 days. With the occupation of the four sites mentioned in the foregoing there remains but a few vacant lots in the Broadway district that are suitable for automobile trade. The automobile and supply industry in Seattle, Wash., has grown so rapidly that building operations have not kept pace.

COLE SERVICE STATION ALTERATIONS—Extensive alterations on the Cole service station and electric garage of C. W. Robinson, in Peoria, Ill., have been completed.

CRAWFORD RESIGNS—J. W. Crawford has resigned his position as assistant engineer for the American Motors Co., to start in the experimental department of the Chalmers Motor Co., Detroit, Mich.

WHITE IN DETROIT—C. M. White, Jr., of the Firestone Tire & Rubber Co., Akron, O., has recently located in Detroit, Mich., as pneumatic tire representative to the automobile manufacturers of Michigan.

LEAVITT WILL BUILD GARAGE—J. W. Leavitt & Co., Seattle, Wash., have announced the purchase of a lot at East Pike street and Eleventh avenue, on which they will build a garage, which will cost in the neighborhood of $35,000.

UNITED MOTOR SERVICE PLANT—The Long Island City, N. Y., colony of service buildings and departments has been added to by the United Motor, New York, Co., which has taken space amounting to 20,000 square feet in the Galvin Bldg., Thirteenth street and East avenue.

CONVENTION IN BOSTON—Makers of commercial and pleasure electric vehicles are to meet in Boston, Mass., at a convention to be held there May 20, in conjunction with other big electric interests. Papers will be read on various subjects, among them the New England Motor Field, Advertising, Trucks vs. Pleasure Cars, and Gasoline vs. Electrics.

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS.

BROOKLYN, N. Y.—Noden's Auto Trucking Co.; capital, $10,000; to do automobile trucking. Incorporators: Abraham Noden, Ada Noden, Benjamin H. Noden.

BURGAW, N. C.—Pender Auto Co.; capital, $15,000; to deal in automobiles. Incorporators: C. B. Sodergrist, F. M. Lewis.

CINCINNATI, O.—Imperial Auto Livery Co.; capital, $2,000; to conduct an automobile and livery business and deal in automobiles. Incorporators: S. F. Glassemeyer, William Shullman, N. A. Michelson, Joseph Lemkuhle, C. T. Ryan.

CLEVELAND, O.—Krit Motor Sales Co.; capital, $10,000; to deal in automobiles an daccessories. Incorporators: R. S. Smith, C. A. Smith, C. A. Sell, C. P. Tampler, D. Hakes.

NEWARK, N. J.—Carlough & Mallon, Inc.; capital, $50,000; to deal in automobiles. Incorporators: E. D. Carlough, F. V. Carlough, W. L. Mallon.

NEW YORK CITY—Indiana Motor Truck Sales Co.; capital, $10,000; to manufacture and repair automobiles. Incorporators: W. A. Schwarskoff, Rosalind Lovy, L. C. Knoegel.

PLATTE CENTER, NEB.—Platte Center Automobile Co.; capital, $15,000; to deal in automobiles. Incorporators: E. J. Macken and others.

RALEIGH, N. C.—Dixie Motor Co.; capital, $10,000; to manufacture and sell automobiles. Incorporators: J. C. Arbagist, J. E. Craddock, J. B. Anderson.

SAN FRANCISCO, CAL.—Pacific Kissel Kar Co.; capital, $500,000; to deal in automobiles. Incorporators: W. H. Hughson, G. N. Emmons, H. K. Butterfield.

SCHENECTADY, N. Y.—Schenectady Auto-Car Co.; capital, $10,000; to deal in automobiles. Incorporators: Emmett Fisher, A. Lengenauer, L. Ruonfigilio, W. S. Carman, F. Howenstein, Lee Foy, C. A. Mullen, O. S. Wagner, J. Wagner, E. Kling.

TARRYTOWN, N. Y.—Motokart Co.; capital, $250,000; to manufacture light commercial automobiles. Incorporators: A. R. Gormully, B. J. Knerr.

WILMINGTON, DEL.—Commer Truck Co. of America; capital, $3,000,000; to manufacture motor trucks. Incorporators: J. F. Curtin, H. O. Coughlin, J. M. Satterfield.

GARAGES AND ACCESSORIES

ASHEVILLE, N. C.—Phillips Tire Co.; capital, $10,000; to manufacture automobile tires. Incorporators: W. L. Phillips, E. Craddock.

BIRMINGHAM, ALA.—Birmingham Motor and Country Club; capital, $150,000; to carry on an automobile club. Incorporators: Oscar Turner, Solon Jacobs, G. A. Blinn, Jr.

BROOKLYN, N. Y.—Self-Generating Motor Co.; capital, $250,000; to manufacture machines for generating steam. Incorporators: O. G. Holzhausen, R. T. Maul, H. B. Wood.

CINCINNATI, O.—National Automobile School of Cincinnati; capital, $50,000; to conduct an automobile school and garage and repair shop and to manufacture and deal in motor vehicle supplies and accessories. Incorporators: G. A. Hawley, H. G. Williamson, W. A. Evan, C. R. McComas, J. D. McCracken.

CLEVELAND, O.—Elastic Tread Tire & Wheel Co.; capital, $25,000; to manufacture patented elastic treaded tire wheels. Incorporators: J. A. Murrey, R. E. Mollenkopf, F. J. Axel, Peter Schneider, F. O. Joss, W. J. Young.

DETROIT, MICH.—American Lamp & Stamping Co.; capital, $100,000; to engage in the manufacture of automobile lamps and plumbing supplies. Incorporators: G. E. Edmunds, William Jones.

EAST PALESTINE, O.—McGraw Tire & Rubber Co.; capital, $1,000,000; to manufacture automobile tires. Incorporators: J. C. Chaplin, C. H. Bolton, J. S. Wilson, George Flaccus, E. C. McGraw, L. N. McGraw, Robert McGraw, John Morgan, R. F. Taggart, R. B. Taggart, J. C. Chamberling, H. O. Fraser, C. I. Merwin.

HOLYOKE, MASS.—Auto Accessory Mfg. Co.; capital, $25,000; to manufacture automobile accessories. Incorporators: W. J. Shannon, E. N. Frary, E. A. Frary.

JOPLIN, MO.—Arnold Motor and Supply Co.; capital, $2,000; to deal in automobile accessories. Incorporators: J. L. Arnold, Ida Tweed Arnold, Flora Arnold Snider.

MORAVIA, N. Y.—Auburn & Moravia Auto Bus Co.; capital, $7,000; to run an automobile bus line. Incorporators: E. C. Weaver, E. D. Parkhurst, F. W. Ackerman.

NASHVILLE, TENN.—Card Taxicab Co.; capital, $1,000; to engage in an automobile taxi business. Incorporators: C. C. Card, Glenn Taylor, W. O. Taylor, C. W. Carle, C. S. Mayfield.

NEW YORK CITY.—Allied Motor Accessories Co.; capital, $10,000; to deal in automobile accessories. Incorporator: Annie Harroun.

NEW YORK CITY—Mottlau Transmission Inc.; capital, $250,000; to manufacture transmission, etc. Incorporators: A. J. Mottlau, W. L. Post, T. F. Conrad.

NEW YORK CITY.—National Spark Plug Co.; capital, $10,000; to manufacture spark plugs. Incorporators: R. L. Cherburg, C. B. Bennett, Agnes Boselman.

NEW YORK CITY.—Schermerhorn Garage Co.; capital, $20,000; to carry on a garage business. Incorporators: Jacob Ginsburgh, Leo Rosett, P. A. Lee.

NEW YORK CITY.—Still's Automobile & Accessories Co.; capital, $10,000; to deal in accessories. Incorporators: G. M. Still, George Edwin Still, Josiah H. Still.

NEW YORK CITY.—Wagner Specialty Co.; capital, $5,000; to deal in automobile accessories. Incorporators: A. F. Wagner, Frederick Walsh, Moses Morris.

PITTSBURGH, PA.—Federal Auto Supply Co.; capital, $10,000; to deal in accessories. Incorporators: C. O. Herr, G. M. Newmyer, C. D. Greene.

PITTSBURGH, PA.—Pittsburgh Auto Transit Co.; capital, $5,000; to carry on an automobile transportation business. Incorporators: A. V. Crookston, H. B. Oursler, W. A. Feltyberger, C. R. Beatty.

PITTSBURGH, PA.—Transmission Engineering Co.; capital, $13,000; to build an electric transmission. Incorporators: G. N. Lemmon, A. W. Burke, H. L. Patterson, V. H. Ely, B. W. Kerr, M. Epstein, L. C. Hart.

PRINCE ALBERT, SASK.—Owners' Garage Co.; capital, $20,000; to carry on a general garage business.

RICHMOND HILL, N. Y.—Richmond Hill Garage & Machine Co., Inc.; capital, $6,000; to carry on a garage business. Incorporators: M. E. Tunon, C. H. Ryan, A. F. Ryan.

ROXBURY, W. VA.—Hampshire Garage Co.; capital, $5,000; to carry on a general garage business. Incorporators: J. J. Cornwell, T. F. Martin, W. W. McClane.

SASKATOON, SASK.—Standard Auto & Supply Co.; capital, $50,000; to manufacture automobile supplies.

TOTTENVILLE, N. Y.—Tottenville Garage Co.; capital, $500; to carry on a general garage business. Incorporators: I. A. Silver, Jr., G. W. Carfoot, E. L. Silver.

WHEELING, W. VA.—Belleaire Automobile Garage Co.; capital, $10,000; to carry on a garage business. Incorporator: Hart Morris.

WORCESTER, MASS.—Worcester County Automobile Owners' Assn.; capital, $5,000; to conduct an automobile club. Incorporators: J. W. Healy, E. H. Divoll, H. A. Wood.

CHANGES OF NAME AND CAPITAL

AKRON, O.—Stern Double Cushion Co.; capital decrease from $200,000 to $10,000.

DEKALB, ILL.—DeKalb Wagon Wks.; capital increase to $50,000.

NEW YORK CITY.—Joscelyn Stable Co.; change of name to the Joscelyn Garage, Inc.

WASHINGTON, D. C.—G. R. Cowie Co.; change of name to G. R. Cowie Co., Inc.

New Automobile Agencies Established During the Week

PLEASURE VEHICLES

Place	Car	Agent
Austin, Tex	Henderson	W. L. Heiermann
Avon, Ill	Henderson	O'Donnell & Sailer
Bakersfield, Cal	Henderson	C. P. Wilkes
Bar Harbor, Me	R-C-H	C. L. Brewer
Bay City, Mich	Cole	Miller Co.
Bay Head, N. J	Henderson	Applegate's Garage
Bennington, Vt	Cole	B. A. Quinlan
Boston, Mass	Columbus	Imperial Auto Co.
Canajoharie, N. Y	Henderson	E. B. Burnap
Chicago, Ill	Henderson	O. R. Wolfe
Cincinnati, O	Henderson	Armstrong Motors Co.
Columbus, O	Detroiter	Batdorf & Corbett
Corpus Christe, Tex	Henderson	J. C. Cline
Danville, Va	Cole	Virginia City Motor Co.
Denton, Tex	Cole	B. L. Taylor
Des Moines, Ia	Henderson	Guarantee Motor Co.
Dunkirk, N. Y	Henderson	Dunkirk Boiler & Mch. Co.
Falconer, N. Y	Henderson	Falconer Garage
Frankfort, Ind	Henderson	C. M. Anderson
Great Falls, Mont	Cole	Dr. J. A. Niles
Hackensack, N. J	Henderson	G. W. Conklin
Halifax, N. S	Franklin	C. L. Newman, Ltd.
High Springs, Fla	Henderson	H. McL. Grady
Hillsboro, O	Chalmers	D. S. Durnell
Hollister, Cal	Henderson	R. L. Allen
Jacksonville, Fla	Henderson	Central Garage
Jersey City, N. J	Henderson	Wacker's Garage
Lewiston, Mont	Cole	S. C. Weaver
Lorain, O	Reo	F. S. Rathwell
Los Angeles, Cal	Touraine	R. del Valle
Mason City, Ia	Cole	Murray & Daniels
Melbourne, Aus	Moon	Moon M. C. Co.
Montpelier, Vt	Cole	Lane Mfg. Co.
Montreal, Can	Henderson	Fred Ritchie
Nashua, N. H	Henderson	H. C. Lintott
Nashville, Tenn	Henderson	R. C. Hopper
Norfolk, Neb	Henderson	M. C. Howell
Oakley, O	Henderson	John Rempe
Oklahoma City, Okla	Henderson	H. D. Willcox
Paterson, N. J	Henderson	E. A. Browne Auto. Co.
Phoenix, Ariz	Henderson	N. Friedman
Philadelphia, Pa	Moline	Walter Harper Co.
Philadelphia, Pa	Pilot	Raymond McCormick
Philadelphia, Pa	S. G. V	J. P. Bonsal
Portland, Ore	Regal	Sieret & Peterson Co.
Portland, Ore	Studebaker	Oregon Motor Car Co.
Providence, R. I	Henderson	Henderson Motor Sales Co.
Rensselaer, Ind	Franklin	Alter & Kannal
Rockford, Ill	Henderson	August Miller
Salem, Ind	Cole	C. M. Crim & Son
San Diego, Cal	Henderson	Griffin & Anderson
Santa Barbara, Cal	Henderson	Harry Wood & Son
Savannah, Ga	Franklin	J. C. Lamb Auto. Repair Co.
Seattle, Wash	American	Miller Auto. Co.
Sheffield, Mass	Cole	A. H. Tuttle
Silverton, Tex	Henderson	Fred Biffle
Stamps, Ark	Cole	H. M. Hudgens
Tacoma, Wash	Henderson	H. W. Doherty
Tampa, Fla	Henderson	Lee McDonell
Washington, D. C	Cartercar	O. A. Reed
Wellsville, O	Henderson	E. Whitacre Auto. Co.
West Hoboken, N. J	Henderson	E. P. Guenther
York, Pa	Metz	J. P. Lecrone

COMMERCIAL VEHICLES

Place	Car	Agent
Columbus, O	Blair	Columbus Mill & Mine Sup. Co.
Los Angeles, Cal	Smith-Milwaukee	M. S. Bulkley & Co.
Milwaukee, Wis	Menominee	Deuster & Tellier Auto. Co.
Minneapolis, Minn	Kelly-Springfield	W. L. Davis
Ottawa, Ont	Indiana	B. F. Benson
Pittsburgh, Pa	Dorris	W. D. Morris